

# Population Development of Baltic Bird Species: Great Cormorant (*Phalacrocorax carbo sinensis*)

## Update 2018

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## Key message

During the 19<sup>th</sup> century, the Great Cormorant was exterminated as a breeding bird in several Baltic countries. The persecution continued until the mid of the 20<sup>th</sup> century, and in the early 1960s the European breeding population of the continental subspecies *sinensis* had declined to 4,000 breeding pairs (bp) only, of which Germany and Poland hosted more than the half. During the following two decades, the population development apparently has also been affected by the harmful effects of DDT and PCB.

As a result of protection measures, and seemingly also due to the ban of DDT and PCB, breeding pair numbers started to increase during the second half of the 1970s. During the 1980s, the Cormorant started to expand its range towards the northern and eastern parts of the Baltic. Currently, the species is present in the whole Baltic Sea area, including the northern parts of the Gulf of Bothnia.

Baltic-wide surveys in 2006, 2009 and 2012 showed that the Baltic population had stabilized at a level of 155,000 – 170,000 bp during that period. However, after 2012 breeding pair numbers have still increased in the eastern and northern Baltic. Hence, the current population is estimated at 190,000-210,000 bp.

The highest population densities are found around the highly eutrophic estuaries of the southern Baltic (Odra-, Vistula-, and Curonian lagoon).

## Results and assessments

### Relevance of the indicator for describing developments in the environment

The Great Cormorant (*Phalacrocorax carbo sinensis*) is a representative of species which nearly have been extinct due to persecution in the 19<sup>th</sup> and first half of the 20<sup>th</sup> century. Its current development shows the recovery after the establishment of effective protection measures and the ban of DDT and PCB. The recovery takes place both in population size and in breeding range.

Furthermore, the Cormorant is a species which benefits from eutrophication.

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## Policy relevance and policy references

The Cormorant is protected by the provisions of the EU Bird Directive (2009/147/EEC), which are implemented by the Member States into national law. This means, the legal protection status is similar in all Baltic Sea states except of Russia. The species was deleted from the Annex I of the Bird Directive in 1997, *i.e.*, there is no longer obligation for the Member States to establish Special Protected Areas (SPA). It is also not listed in Annex II of the Bird Directive, which means the national states are not allowed to give the Cormorant an open hunting season, *i.e.* the species cannot be a game bird. However, according to Article 9 (1) of the EU Bird Directive, under certain conditions the Member States may allow derogations from the protection provisions of the Directive. Since the Cormorant is considered to cause damages to fish stocks and fisheries, several Member States make use of Article 9 (1) and allow derogations with the aim “*to prevent serious damage to crops, livestock, forests, fisheries and water*” or “*for the protection of flora and fauna*”. The activities permitted by the responsible authorities include destruction of nests, oiling of eggs, and shooting. Furthermore, illegal actions against Cormorants are also reported from several countries.

Despite the possibility of derogations from the protection provisions, national as well as European fishery and angler associations strongly demand a management of the Cormorant population with the aim to reduce the population size. These demands resulted in a non-legislative resolution of the European Parliament, adopted on December 4, 2008, on “*the application of a European cormorant management plan to minimise the increasing impact of cormorants on fish stocks, fishing and aquaculture.*”

This resolution calls the Commission to “*submit a **cormorant population management plan in several stages**, seeking to integrate cormorant populations into the environment as developed and cultivated by man in the long term without jeopardising the objectives of the Wild Birds Directive and Natura 2000 as regards fish species and marine and freshwater ecosystems. MEPs (Members of the European Parliament) urge the Commission, in the interests of greater legal certainty and uniform interpretation, to provide without delay a clear definition of the term ‘serious damage’ as used in Article 9(1)(a), third indent, of the Wild Birds Directive (The Wild Birds Directive (79/409/EEC) of 2 April 1979). The Commission should also produce more generalised guidance on the nature of the derogations allowed under Article 9 (1) of the Wild Birds Directive, including further clarification of the terminology where any ambiguity may exist.*”

Furthermore, the MEPs suggest that, “*by means of systematic monitoring of cormorant populations supported by the EU and the Member States, a reliable, generally recognised and annually updated database should be drawn up on the development, size and geographical distribution of cormorant populations in Europe. They call on the Commission to put out to tender, and finance, a **scientific project** aimed at supplying an estimation model for the size and structure of the **total cormorant population** on the basis of currently available data on breeding population, fertility and mortality. The Commission and the Member States are called upon to foster in an appropriate manner the creation of suitable conditions for bilateral and multilateral scientific and administrative exchanges, both within the EU and with third countries.*”

(<http://www.europarl.europa.eu/oeil/FindByProcnum.do?lang=en&procnum=INI/2008/2177>).

In its response to the EP Resolution of 4 December 2008, the Commission recognises the need for co-ordinated action but does not consider that an EU-wide management plan would be an appropriate measure to address this problem. Under the Birds Directive there is no legally binding mechanism for an EU-wide management plan. Furthermore, there is no consensus between Member States on the type of action to take, or on the need and value of managing Cormorant populations at a pan-European scale. The Commission considers that it is not proportionate to argue for action at EU level to solve problems of a regional scale. Moreover, simply reducing the population will not necessarily reduce the numbers of Cormorants around the most attractive feeding sites or the impact on those fisheries and fish stocks. A combination of local control and mitigation measures has probably more chances of success than a general reduction of the population.

The Commission is also in favour of ensuring better scientific data and making available objective and updated information that could be widely accepted by all stakeholders regarding the populations and the biology of the Cormorants across the EU and their impact on fisheries. With this purpose in mind, the Commission established a platform for exchange and dissemination of technical information in particular on mitigation, non-lethal and lethal measures, social and economical issues and data on Cormorant populations. This is an opportunity to bring together relevant experts, officials and stakeholders to identify the best way forward. It will be useful to promote regional cooperation among neighbouring countries concerned by this issue. Recent activities of the European Commission include

- Publication of a guidance document “*Great Cormorant - Applying derogations under Article 9 of the Birds Directive 2009/147/EC*” in 2013  
[http://ec.europa.eu/environment/nature/pdf/guidance\\_cormorants.pdf](http://ec.europa.eu/environment/nature/pdf/guidance_cormorants.pdf)
- Collaboration with the IUCN/Wetlands International Cormorant Research Group in order to organise pan European counts of breeding colonies (in 2012) and of night roosts used in winter (January 2013).
- Establishment of a technical internet platform (the EU Cormorant Platform; [http://ec.europa.eu/environment/nature/cormorants/home\\_en.htm](http://ec.europa.eu/environment/nature/cormorants/home_en.htm)), through which information of relevance for Member States and other users is made available, has been established; the Platform has been updated in April 2014. The main new material includes:
  - A more detailed presentation concerned with management of cormorant/fishery conflicts and practical management.  
<http://ec.europa.eu/environment/nature/cormorants/management.htm>
  - A detailed description of the issues related to potential management of cormorant populations on a pan-European scale. Direct link to pdf document:  
[http://ec.europa.eu/environment/nature/cormorants/files/Sustainable\\_management\\_of\\_cormorants.pdf](http://ec.europa.eu/environment/nature/cormorants/files/Sustainable_management_of_cormorants.pdf)
  - A link to the Meeting Report from the fourth meeting in the Stakeholders’ Liaison Group that took place in Belgium in October 2013. See the end of this page:  
<http://ec.europa.eu/environment/nature/cormorants/stakeholders.htm>

Since the Baltic Sea area hosts a very large proportion of the European Cormorant population and since all Baltic Sea states except of Russia are Member States of the European Union, all activities and actions taken on EU level are directly relevant to HELCOM.

### Provisional conservation targets

Actions against the Cormorant with the aim to reduce damages caused to fisheries or impacts on threatened fish species as well as incidental killing in fishing gear should not affect the range and favourable conservation status of the species.

## Assessment

### Cormorant Population Development in the Baltic Sea Area

During the 19<sup>th</sup> century, the Great Cormorant was exterminated as a breeding bird in several Baltic countries. Persecution continued during the 20<sup>th</sup> century, though at a lower level. The European breeding population

of the continental subspecies *sinensis* was small throughout the first half of the 20<sup>th</sup> century. The species was successful in re-colonising Denmark in 1938 and Sweden in 1948 (Bregnballe & Gregersen 1995; Engström 2001). In Lithuania, a few pairs bred within the Grey Heron colony of Juodkrantė (Curonian Spit) since the 1960s (1982: 7 bp; Alex 2011).

In the early 1960s, Germany and Poland hosted more than half of the entire European breeding population estimated at that time at 3,500-4,300 bp (Bregnballe 1996). During the 1960s until the mid-1970s the population was stagnant (Table 1), most likely due to harmful effects of DDT and PCB. Limited control measures may also have affected the population development at that time.

Table 1: Breeding pair numbers of the Cormorant in the Baltic Sea area 1959-1980.

	1959	1970	1975	1980
Denmark	333	250	940	2,037
Sweden	100 <sup>1</sup>	175	337	753
Mecklenburg-Western Pomerania	900	1,035	856	705
Poland	1,800	1,100 <sup>2</sup>	1 300 <sup>3</sup>	1,400
Lithuania	0	<10	<10	7 <sup>4</sup>
<b>Baltic Sea total</b>	<b>3,133</b>	<b>2,560</b>	<b>3,440</b>	<b>4,900</b>

As a result of protection measures and presumably also due to the ban of DDT and PCB, breeding pair numbers began to increase during the second half of the 1970s (van Eerden & Gregersen 1995). By 1981, numbers in the Baltic Sea area had reached approximately 6,500 bp, and in 1991 the population was already about 51,000 bp. At the same time, an expansion to more eastern and northern breeding areas took place. In Estonia, the Cormorant started to breed in 1983, in Kaliningrad Region of Russia the first colony was found in 1985, on Gotland Cormorants started breeding in 1992, and in Finland in 1996 (SYKE 2007; Alex 2011; Grishanov et al. 2014). The range expansion even reached the northern part of the Bothnian Bay.

An annual complete Cormorant surveillance is established in some of the Baltic countries (e.g., Denmark, Germany, Estonia and Finland), but not in all (e.g., not in Sweden and Poland). However, the available data include representative samples from all parts of the Baltic Sea, giving a clear picture for the development in the different regions.

For the years 2006, 2009 and 2012 complete census data are available for the Baltic Sea area (Table 2). The data show a stabilisation of breeding pair numbers in the range of 155,000-170,000. Some fluctuations in recent times can be attributed to winter severity. For instance, the extremely harsh winter 2009/10 caused subsequent population declines in all Baltic regions (see fig. 2-5). Furthermore, the data reveal regional differences in population development: Whereas the breeding pair numbers in the south-western parts of the Baltic is about stable, the population in the north-eastern parts is still growing (fig. 2-5).

Table 2: Breeding pair numbers of the Cormorant in the Baltic Sea area 2006-2012.

Country	2006	2009	2012
Sweden	44,000	43,500	40,598

<sup>1</sup> Numbers for 1957, for 1959 no data available.

<sup>2</sup> Numbers for 1972

<sup>3</sup> Numbers for 1973

<sup>4</sup> Number for 1982

Finland	5,770	16,012	17,258
Russia - St Petersburg region	3,800	5,000-6,000	4,605
Estonia	11,695	13,689	13,000
Latvia	250	>1,000	3,106
Lithuania	3,550	4,180	3,200
Russia – Kaliningrad region	8,500	6,200-6,700	9,535
Poland	25,800	27,100	26,600
Germany – Mecklenburg-Western Pomerania	12,078	13,360	11,499
Germany – Schleswig-Holstein	3,095	2,448	2,477
Denmark	38,014	33,008	27,237
<b>Total</b>	<b>156,552</b>	<b>165,500-167,000</b>	<b>159,115</b>

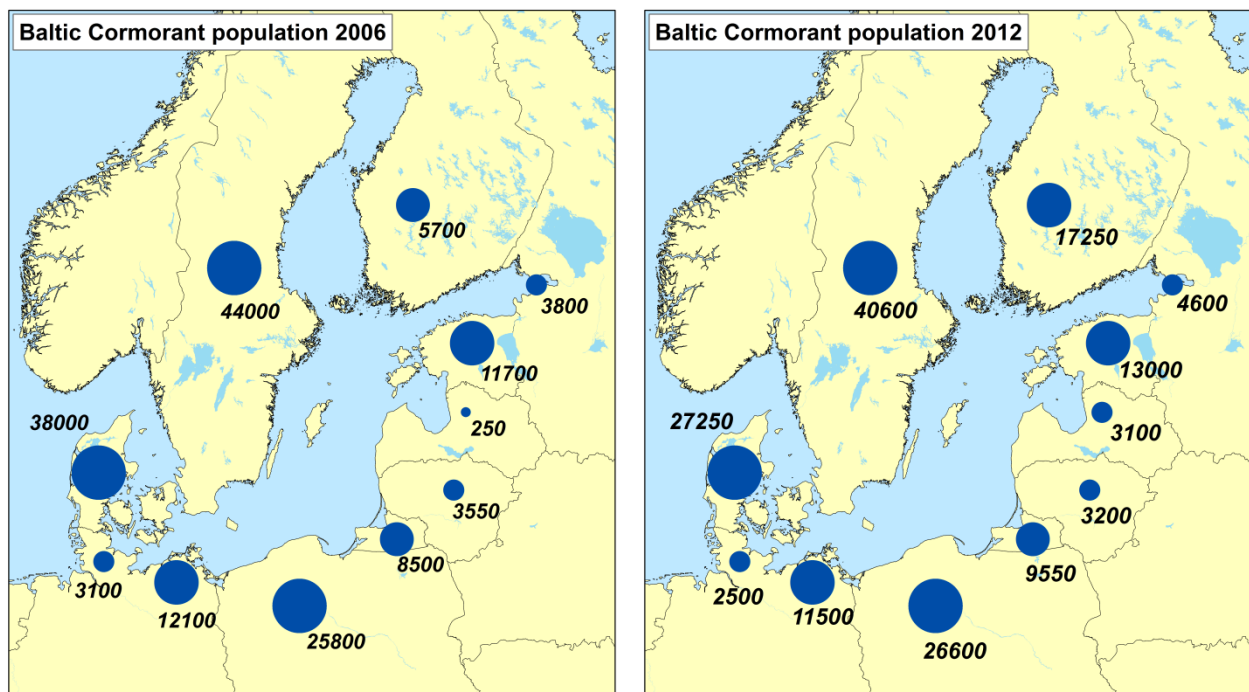


Figure 1: Breeding pair numbers of the Great Cormorant in the Baltic Sea area 2006 and 2012. Data according to IUCN/Wetlands International Cormorant Research Group; pan-European Cormorant censuses 2006 and 2012 (INTERCAFE 2012; Bregnballe et al. 2014a).

Figure 2 shows the development of the Cormorant population in the south-western Baltic. The population has been about stable since the mid-1990s. The harsh winter 2009/2010 caused a pronounced decline during the following years, but then the Cormorant numbers recovered to the previous level of c. 50.000 bp.

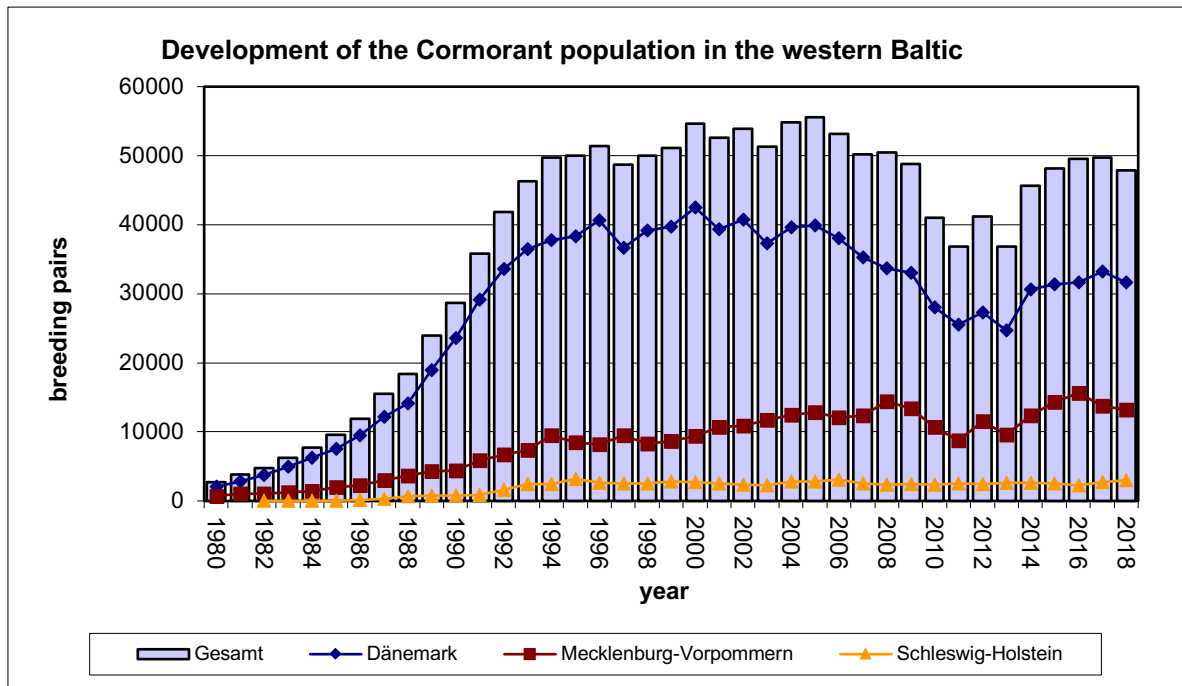


Figure 2: Population development of the Cormorant in the south-western Baltic 1980-2013.

The development on Gotland is representative for the central Baltic. Cormorants started to colonise Gotland in 1992. The population reached a maximum of 10.500 bp in 2008, but has been declining since 2014 (Figure 3).

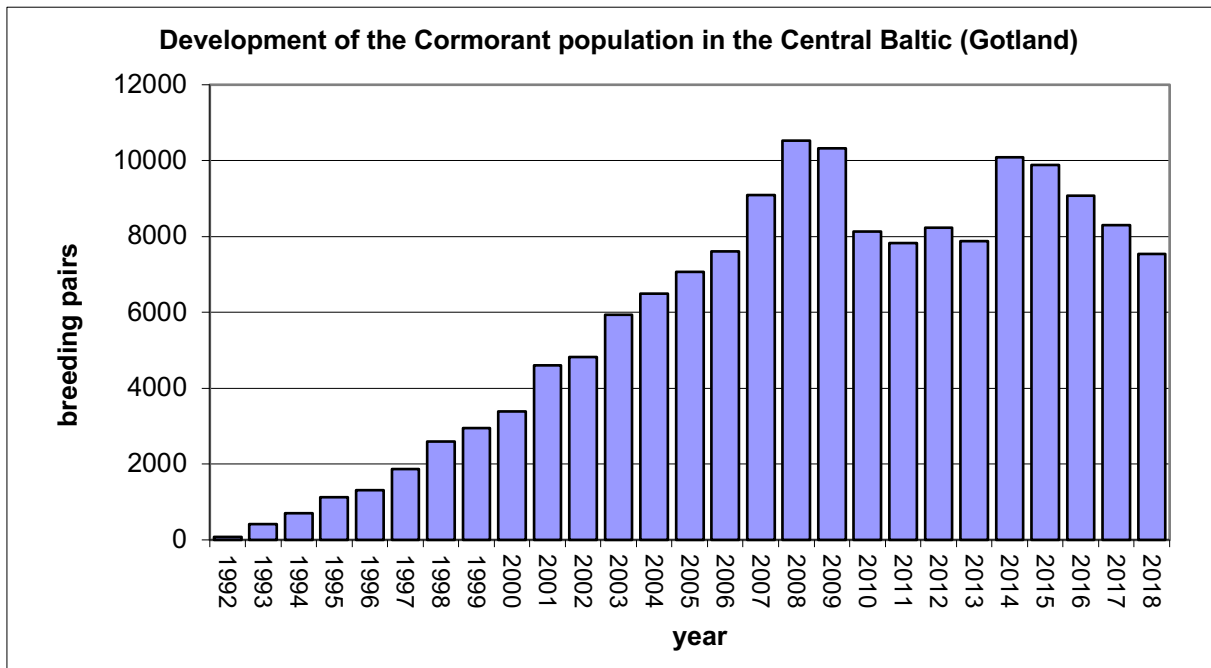


Figure 3: Number of breeding pairs of Cormorants on the island Gotland, Sweden. Data from K. Larsson, M. Hjernqvist, B. Hjernqvist, S. Hedgren and C. Hermansson.

The development in the eastern and northern parts of the Baltic is illustrated by Estonian and Finland data. The first breeding of Cormorants in Estonia was recorded in 1983, but the population remained small (< 100 bp) until the end of the 1980s. At the beginning of the 1990s, breeding numbers started to increase rapidly.

In 2018, the breeding pair numbers reached 53.700 (Figure 4; SYKE 2018; Estonian Environment Agency unpubl.).

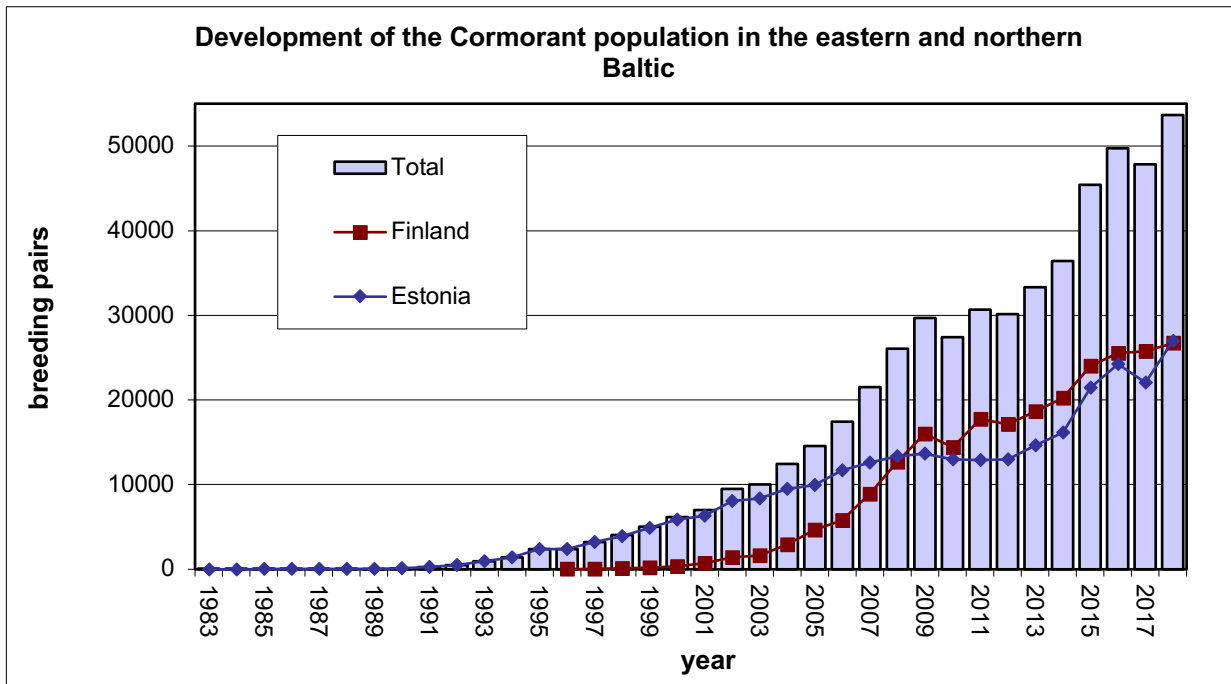


Figure 4: Population development of the Cormorant in the eastern and northern Baltic (Estonia and Finland). Data from SYKE (2008, 2009, 2010, 2011, 2012, 2018), Lilleleht (2008), K. Rattiste (2013, pers. com) and the Estonian Environment Agency.

### Regional distribution of breeding sites

The vast majority of the Cormorants breeding in the Baltic Sea area is nesting in colonies located near to the coast, and almost all large colonies >1,000 bp are found in coastal areas. The breeding sites are quite often islets where the birds build their nests on the ground or on trees. The largest colony currently is found at the Deyma River; Kaliningrad Region of Russia; 9,075 nests have been counted in this colony in 2012 (Grishanov et al. 2014).

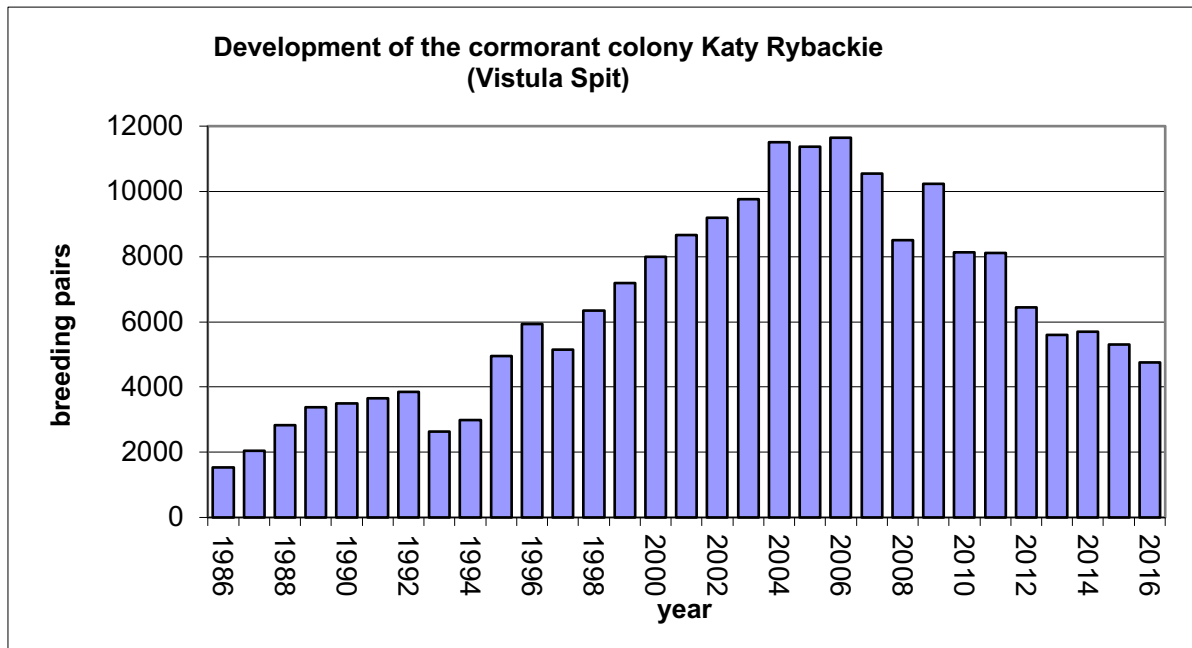


Figure 5: The development of the formerly largest Cormorant colony on Vistula Spit, Poland, 1986-2016. Data from Przybysz (1997), Mellin et al. (1997), Goc et al. (2005), Goc (2006) and M. Goc & P. Stępniewski (pers. com).

The highest concentrations of Cormorants are found around the highly eutrophic estuaries of the large rivers of the southern Baltic: Curonian Lagoon (12,000 bp in 2012 in 3 colonies on the Lithuanian and the Kaliningrad side of the lagoon); Vistula Lagoon (6,450 bp in 2012 in Katy Rybackie, Poland; Figure 5), and Odra lagoon (13,800 bp in 2012 in 6 colonies in Mecklenburg-Western Pomerania and Poland; data from Grishanov et al. 2014, Dagys & Zarankaitė 2014; Bzoma et al. 2014).

### Management actions for Cormorants

Several Baltic countries have initiated management actions to control breeding numbers in areas where Cormorants are causing conflicts with other interests, especially fishery.

#### **Human interventions in colonies:**

**Sweden:** Measures to control Cormorant numbers are carried out in some areas throughout Sweden, but a summary of the effects on a national scale is not available. In recent years, the majority of these actions have taken place along the coasts of Stockholm county and Kalmar county and in Lake Hjälmaren. In the Stockholm archipelago an average of 3,208 eggs were oiled annually between 2001 and 2010. For most years, the number of birds shot and the number of nests destroyed are either below or well below the quotas set for the regions. The quotas are determined by county administrative boards, which also grant permissions. The level of management differs between regions but usually includes both egg control and shooting of adult birds, to some extent also during the breeding season. The main aim of the management actions is to improve conditions for fisheries, although little is known about the effects (Engström & Wirdheim 2014).

**Finland:** Moderate legal population management actions have taken place in Finland since 2010, when the Southwest Finland Centre for Economic Development, Transport and the Environment (ELY Centre) gave a special license to control breeding Cormorants in one small fishing area of pikeperch in the inner part of the Archipelago Sea. The license limited the management actions to scaring Cormorants away from the colonies before egg-laying. Similar licenses were given for two colonies in other areas of the Archipelago Sea and for one colony in the Bothnian Sea in 2016-2017 as a response to conflicts between cormorants and settlement. An investigation of the diet of Cormorants at the south coast of Finland showed that there was no impact on



the local populations of perch and roach, which are the main prey of the species (Lehikoinen et al. 2011). Also on a larger scale no impact was observed on the catches per unit effort of fisheries on perch and pikeperch in coastal Finland (Lehikoinen et al. 2017).

The illegal persecution of Great Cormorants has tapered off markedly during the 2000s. In 2010-2011, 4-5 % of all nests were destroyed illegally, while the proportion was much higher (11-17 %) in 2008-2009 (Rusanen 2014). More recently (2014-2018) the illegal persecution has been fluctuating annually from 0.6 % to 6.8 % of all nests being destroyed.

**Russia:** No actions are taken in the Russian part of the Gulf of Finland. In Kaliningrad region, locals consider the Cormorant as an object of trade, and the bird is commonly used as a food item. During the 2006 census it was reported that conflicts existed between breeding Cormorants and local professional fishermen and anglers in the Deyma River colony. Approximately 5 % of the nests in this colony were destroyed and nestlings were killed for food. In 2012, there was no evidence of any actions by fishermen in the breeding colonies (Gaginskaya et al. 2014; Grishanov et al. 2014).

**Estonia:** Management is carried out in areas where conflicts with fisheries are intense. The main aim is to reduce juvenile production. Oiling of eggs took place in three colonies (two colonies in the Gulf of Finland and one colony in the Gulf of Riga) in 2012 affecting a total of c. 2,000 nests. In many colonies, especially in those at the Gulf of Riga, people have systematically destroyed nests. This is the main reason for a particularly high mobility of colonies in this region (Rattiste 2014).

**Latvia:** In 2012, the authorities permitted management of the Cormorant population at the Nagli fish pond complex. However, there was evidence of illegal shooting of adult birds in the nests in at least one colony during the breeding season 2012 and possibly earlier. In some areas, human disturbance during the start of the breeding season caused Cormorants to abandon the colony (Aluksne Lake in Vidzeme region; Millers 2014).

**Lithuania:** Management is carried out in all Lithuanian breeding colonies of more than 100 nests in order to relieve conflicts with fisheries and aquaculture, and to decrease the impact on forests. The overall aim of the management is to reduce the number of breeding Cormorants by 50 %. Management of colonies primarily includes scaring of breeding birds in late stages of incubation through the use of acoustical and visual deterrents (e.g. fireworks). In 2012, the greatest effect of intervention was in the largest colony near Juodkrantė. As a result of these actions, almost 1,000 Cormorant nests were abandoned in the breeding season. Furthermore, there were approximately 1,000 pairs less attempting to breed in this colony in 2012 compared to 2011 – probably also as a result of nest management measures implemented in previous years (Dagys & Zarankaitė 2014).

**Poland:** Management actions have been carried out in 2012 only in three areas. In two areas the colonies were located next to fish ponds. The aim of the management actions has been to reduce the impact of the birds on fish production. In order to reduce breeding success, nests with eggs were removed (Barycz Valley, dolnośląskie) and eggs were oiled (Raszyn fish-ponds, mazowieckie). Oiling of eggs was also carried out in part of Kąty Rybackie colony (approx. 100 nests) to remove nests from the holiday camp area close to the village (Bzoma et al. 2014).

**Germany:** In Germany, the authorities of the 16 Federal States are responsible for the conservation and management of species. 11 out of 16 federal states have so-called “Cormorant decrees”, which regulate measures to reduce damages by Cormorants on fish stocks, aquaculture facilities or impacts on threatened fish species. Both Baltic Federal States (Mecklenburg-Western Pomerania and Schleswig-Holstein) have Cormorant decrees in force, but they mainly regulate harassment shooting outside the breeding season. However, fishermen are allowed to impede the formation of new colonies by disturbances during the early

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breeding season until March 31. In Mecklenburg-Vorpommern, the only interventions in colonies in recent times have been disturbances by laser pointers in two selected sites during the years 2008-2012 with the aim to study the effectiveness of this method for the reduction of breeding success.

**Denmark:** A national management plan for cormorants sets the framework for possibilities of regulation measures in breeding colonies. In some areas of Denmark (mostly western and northern parts of Jutland) there is an intense management of breeding colonies because of conflicts with the protection of vulnerable fish populations or with fisheries. The management is carried out by the Ministry of Environment and Food or by private land-owners. The most common management action is spraying the eggs in ground-nesting colonies with vegetable oil to prevent the eggs from hatching (Bregnballe et al. 2014b). In many areas successful establishment of new colonies is prevented by scaring or shooting adult birds. The total number of nests exposed to management is currently (2016-2018) c. 4,000 per year or c. 10-15 % of the population (Bregnballe & Sterup 2018). The number of managed nests peaked between 2003 and 2009, when around 6,000 nest per year were exposed to management actions.

### ***Shooting of Cormorants outside the breeding season***

Most countries permit shooting of Cormorants outside the breeding season according to the regulations of Article 9 (1) of the Bird Directive.

Cormorants have been shot since the early or mid-1990s in Denmark (1,900-5,200 annually), Germany (1,500-2,500 in Mecklenburg-Western Pomerania and Schleswig-Holstein), and Sweden (2,000-9,000). In Estonia, shooting of Cormorants was started in 1997, but the bag remained low in all years, reaching a maximum of 707 in 2009. In Latvia, shooting licenses have been issued in 2012 for Nagli fish ponds. In Lithuania, in 2005 the Minister for the Environment issued a legal decree which forms the legal basis for licenses for shooting of Cormorants. In Finland, the provincial government of Åland adopted guidelines for granting permissions to shoot Cormorants in order to reduce damage to fisheries. During the hunting seasons 2008-2014, 3,790 Cormorants were shot, 87 % of them in August-September. In continental Finland the ELY Centre has given special licenses to shoot Great Cormorants in a few fishing areas in south-western and western Finland during the autumn hunting seasons of waterfowl since 2010. During the years 2010-2012, licenses were issued to shoot 990 Great Cormorants in total, but only 204 Great Cormorants were shot. Since then the numbers of shot Cormorants has remained moderate, e.g. 10 shot birds during the autumn seasons 2015-2017, while permissions were granted for 700 birds. From hunting samples obtained during 2010-2011 it was found that ca. 60 % of birds shot were of the nominate subspecies (*P. c. carbo*), apparently originating from northern Norway (Rusanen et al. 2012).

The total number of Cormorants shot in the Baltic Sea area is in the range of 10,000-20,000 birds annually and should not affect significantly the population development.

Besides shooting, incidental killing of Cormorants in fishing gear is another important anthropogenic mortality factor. Local studies and analyses of ring recovery data indicate that the number of birds drowned in fishing gear maybe high, at least in some regions (Bregnballe 1999; Bregnballe & Frederiksen 2006; Žydelis et al. 2009, 2013).

## Metadata

### Technical information

#### Data sources:

**Population data 2006** have been obtained from the European Cormorant Count organized by the Wetlands International Cormorant Research Group and the "Extended network and conflict analysis project" of COST-INTERCAFE. During this census, counts were nationally coordinated by S. Bzoma, M. Goc, I. Mirowska-Ibron & M. Kalisiński (Poland), H. Engström & R. Staav (Sweden), A.R. Gaginskaya, V. Lilleleht, M. Dagys, G. Grishanov & I. Nigmatouline (Russia, Estonia, Lithuania), and K. Millers (Latvia).

**Population data 2009** have been obtained from published annual reports and presentations given at the Baltic Cormorant Symposium in Helsinki, 26-28 January, 2010; for Russia information given by G.V. Grishanov (KAL) and V. Fedorov (PET) has been included. For Poland, data of 2010 have been submitted by S. Bzoma; data for 2009 are not available.

**Population data 2012** have been obtained from the pan-European Cormorant count organized by the EU project CorMan in collaboration with Wetlands International Cormorant Research Group (Bregnballe et al. 2014a: <http://dce2.au.dk/pub/SR99.pdf>)

**Annual surveys** of the breeding population are organized and data are collected by the following institutions or people<sup>5</sup>:

**Denmark:** Danish Centre for Environment and Energy, Aarhus University (published on the web site: <http://bios.au.dk/raadgivning/natur/skarv-udvikling-i-bestande/>)

**Germany:** Staatliche Vogelschutzwarte Schleswig-Holstein; Agency for Environment, Nature Conservation, and Geology of Mecklenburg-Western Pomerania.

**Finland:** Finnish Environment Institute (SYKE; published on the web site <http://www.environment.fi>);

**Estonia:** Vilju Lilleleht (until 2008), K. Rattiste & L. Saks (2009-2014); Estonian Environment Agency

**Gotland (Sweden):** K. Larsson, M. Hjernqvist, B. Hjernqvist, S. Hedgren and C. Hermansson

**Katy Rybackie (Poland):** Michal Goc and Pawel Stepniewski

**Lithuania:** Annual counts in of the colony Juodkrante (largest Lithuanian colony) by the Curonian Spit National Park authorities; complete survey of all Lithuanian colonies in 2005-2009 and 2012 by the Institute of Ecology of the Nature Research Centre.

**Geographical coverage:** The data are covering the entire area of the Baltic Sea states.

The population developments shown in Figures 2-4 are representing annual nest counts in representative regions of the Baltic Sea (south-western Baltic: Denmark, Schleswig-Holstein, Mecklenburg-Western Pomerania; central Baltic: the island Gotland/Sweden, northern and eastern Baltic: Estonia and Finland).

**Temporal coverage:** see figures and table

**Methodology and frequency of data collection:** annual nest counts in all colonies in the sample areas (Denmark, Schleswig-Holstein, Mecklenburg-Western Pomerania, Gotland, Estonia, Finland); annual nest counts in the Katy Rybackie colony/Poland; Baltic-wide Cormorant counts in 2006, 2009 and 2012.

**Quality of information:** The reliability and quality of data is high.

## References

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<sup>5</sup> Population data from Gotland/Sweden and Katy Rybackie are not obtained from official sources.

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