BREEDING NUMBERS OF GREAT CORMORANTS PHALACROCORAX CARBO IN THE WESTERN PALEARCTIC, 2012–2013

2014

IUCN/Wetlands International Cormorant Research Group Report

Scientific Report from DCE - Danish Centre for Environment and Energy No. 99



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Scientific Report from DCE – Danish Centre for Environment and Energy No. 99

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Abstract:	This report presents the status of the breeding population of Great Cormorants <i>Phalacrocorax carbo</i> in Europe and neighbouring countries in 2012. It gives an overview of numbers and distribution and describes changes since 2006. It compiles 38 detailed national and sub-national reports on breeding numbers, colony sizes, colony distribution and the extent of human intervention in breeding colonies.				
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Preface and acknowledgements

This report presents the results from the project 'Cormorant counts in the Western Palearctic'. The project was conducted in collaboration between the European Commission project 'Sustainable management of Cormorant populations' (with the acronym 'CorMan'), the IUCN/Wetlands International Cormorant Research Group and relevant national organisations, institutions and individual key persons.

The main objective of the project was to organize surveys of the breeding populations of Great Cormorants *Phalacrocorax carbo* in the Western Palearctic. The focus has been on the continental sub-species of the Great Cormorant *P. c. sinensis*.

The size and distribution of the breeding population of the sub-species *P. c. sinensis* was monitored in all countries in Europe including Belarus, Ukraine, Armenia, Russia (10 regions) and parts of Azerbaijan and Turkey. The survey took place in 2012 except in a few countries where the survey was conducted in 2013.

More than 1,200 people were involved in the counts and they provided information about nest numbers in more than 1,400 breeding colonies.

The first chapter in the report gives an overview of the results describing numbers and distribution. The overview includes a description of the trends in the development of breeding numbers based on a comparison with a previous Pan-European count of breeding colonies in 2006.

The following 38 chapters are a collection of national and sub-national reports from 32 of the participating countries.

More information about the project 'Cormorant counts in the Western Palearctic', the EC project 'CorMan' and former counts organized by the IUCN/Wetlands International Cormorant Research Group can be found at:

• <u>http://ec.europa.eu/environment/nature/cormorants/home_en.htm</u>

• http://cormorants.freehostia.com/index.htm

Success in achieving the objectives of the counts depended entirely on the commitment from the National Coordinators and their counting teams, of which many have been highly motivated volunteers. Therefore, we warmly thank them for their valuable contribution. We would also like to acknowledge the contribution from the National Coordinators of which many found the time to collaborate with us in preparing the country by country presentations included in this report.

We are pleased that the European Commission was able to collaborate with The IUCN/Wetlands International Cormorant Research Group and the individual countries through the EC funded 'CorMan' project. The CorMan project facilitated meetings of the Counts Steering Group, helped with communication, collation of count results, writing up of results and support during the preparation of the reports from the individual countries.

Summary

This report gives an overview of the size and distribution of the breeding population of Great Cormorants *Phalacrocorax carbo* in the Western Palearctic in 2012 as well as detailed descriptions of the status for the breeding populations in 38 of the areas (countries or parts of countries) included in the survey. The national and sub-national surveys were conducted in coordination with and facilitated by the project '*Cormorant counts in the Western Palearctic*' lead by the IUCN/Wetlands International Cormorant Research Group and the European Commission project 'CorMan' contracted by Aarhus University, Denmark and the Centre for Ecology & Hydrology, United Kingdom. The counts project gave guidance on methods, developed web-based tools, collated details from the counts, compiled an overview at the Pan-European level and provided support during the writing up of national results.

Highest priority was given to ensure that all breeding colonies were counted in areas where the continental sub-species *P. c. sinensis* was breeding. Attention was also given to assess the size of the breeding populations in countries from where Great Cormorants migrate to EU Member States. To obtain information about recent trends in population development in different parts of Europe, comparisons were made with breeding numbers recorded during a similar Pan-European count in 2006.

The size of the breeding population of Great Cormorants in the Western Palearctic was estimated to be between 406,000 and 421,000 breeding pairs in 2012 (excluding some regions in Russia and the western part of Kazakhstan). It is estimated that around 42,500 breeding pairs belonged to the Atlantic sub-species *P. c. carbo* and around 371,000 to the continental sub-species *P. c. sinensis*. Approximately 294,000 pairs of the *sinensis* sub-species bred west of the western borders of Russia and Turkey (Kaliningrad and the Russian part of the Gulf of Finland included). Within this area the 28 EU Member States had 214,800 breeding pairs of the continental sub-species.

The species was recorded breeding in almost all the countries in Europe in 2012. While 50 % of all *sinensis* birds were breeding in large colonies with more than 1,000 nests, most breeding colonies had fewer than 100 nests. The largest colony was found in Ukraine and had 18,000 nests. Most other large colonies with more than 1,000 nests were found around the Baltic Sea, the Black Sea, the Sea of Azov, the Caspian Sea and in The Netherlands.

The 38 national or sub-national presentations of the current status refer to 2012 except for four countries where the descriptions refer to 2013 or to historical records of breeding. Each of these presentations includes descriptions of the total size and distribution of the breeding population and presents information about numbers and sizes of breeding colonies, as well as the extent of human intervention in them. Some of the descriptions also include information about trends in population development. Each of the national or sub-national presentations is introduced by a summary.

The following paragraphs describe the status of the breeding population in 2012 and the change in numbers from 2006 to 2012 within each of four major areas within the Western Palearctic:



A male Great Cormorant bringing seaweed to increase the strength of the nest, Vorsø, Denmark. Photo: Kim Biledgaard.

The North-East Atlantic. This area includes most countries along the northeastern coasts of the Atlantic Ocean (countries that have coasts along the Baltic Sea are not included). The Atlantic sub-species *P. c. carbo* as well as the continental sub-species *P. c. sinensis* are breeding in this area.

The North-East Atlantic – P. c. carbo. Out of the 42,500 breeding pairs most bred along the coast of Norway (ca. 19,000 pairs). For the United Kingdom (UK) and France breeding numbers could not be determined with certainty because some of the colonies in these countries had both sub-species breeding, and the proportion of each sub-species was not known for all colonies. It was estimated that the UK had 6,500 breeding pairs along the coast and 955 pairs of the *carbo* sub-species in inland colonies, and the UK was thus the second most important breeding area for the Atlantic sub-species in Europe. France had 8,673 breeding pairs of which about 3,000 were estimated to be *carbo* birds. Iceland had 4,772 breeding pairs and the estimate for the coasts of Ireland was 4,366 pairs. It was further estimated that the Barents Sea and White Sea coasts had around 4,600 breeding pairs in 2012, but these estimates were uncertain due to incomplete coverage.

The data on trends indicated that breeding numbers of *P. c. carbo* had declined markedly in Norway, by around 11,000 pairs (-37 %) from 2006 to 2012. A declining trend was also recorded along the coast of the UK. Breeding numbers had either remained stable or increased in Iceland, the Barents Sea (the Russian Federation) and Ireland, as well as in France and in inland areas in the UK.

The North-East Atlantic – P. c. sinensis. It was estimated that the continental sub-species had 36,900 breeding pairs in this area. The majority of these –

23,556 pairs – bred in The Netherlands where the highest densities were found around Lake IJsselmeer. France was the second most important breeding area – 5,700 breeding pairs estimated to belong to the *sinensis* subspecies. The other breeding areas included inland areas in the UK (estimated at 2,809 pairs), the southern coast of Norway (2,500 pairs), Spain (1,605 pairs) and Belgium (1,584 pairs). Great Cormorants were not breeding in Portugal, Luxembourg and Monaco in 2012.

Comparison with 2006 showed that noticeable increases had occurred in Spain (an increase of 1,300 pairs, 453 %), in inland areas in France (by 2,500 pairs, 62 %) and in southern Norway (by 1,100 pairs, 87 %). Numbers had remained unchanged in The Netherlands and Belgium.

The Baltic Sea – *P. c. sinensis.* This area covers the countries along the Baltic Sea and the Russian part of the Gulf of Finland and Kaliningrad. Total breeding numbers were 167,700 pairs, and this region constituted the most important breeding area in Europe for the continental sub-species. The highest numbers were recorded in Sweden (40,598 pairs), Denmark (27,237 pairs), Poland (26,600 pairs) and Germany (22,550 pairs). Together with The Netherlands, these countries constituted the core breeding area for the continental sub-species in Europe for more than 35 years. However, during and after the 1990s the breeding population expanded eastwards in the Baltic Sea.

The other countries around the Baltic Sea had the following breeding numbers in 2012: Finland (17,258 pairs), Estonia (13,000 pairs), Kaliningrad (9,535 pairs), the Russian part of the Gulf of Finland (4,605 pairs), Lithuania (3,200 pairs) and Latvia (3,106 pairs). The largest concentrations of breeders were found in association with the large and highly eutrophic lagoons in the southern Baltic, i.e. Vistula Lagoon, Odra Lagoon and the Curonian Lagoon.

Compared with 2006 breeding numbers had increased by 17,000 pairs (28 %) along the eastern coast of the Baltic Sea and decreased by 15,000 pairs (-19 %) in the western part of the Baltic Sea. The most marked increase was recorded in Finland (an increase of 11,500 pairs, 199 %), and the highest decrease was recorded in Denmark (a decline of 10,800 pairs, -28 %).

Central Europe and Mediterranean – P. c. sinensis. The area includes the countries in central Europe and in the central and eastern Mediterranean. The total numbers of breeders were 20,839 pairs, of which 40 % were found in only four colonies. The largest colony had 4,730 nests and was located at Kerkini Lake in northern Greece. The three other large colonies had 1,000-1,200 nests and were found in FYRO Macedonia, Montenegro and Italy.

At the national level, Greece had the highest number of breeding pairs (6,978 pairs), followed by Italy (3,914 pairs) and Hungary (2,700 pairs). The five other countries that had more than 1,000 breeding pairs were Switzerland (1,037 pairs), Croatia (1,331 pairs), Serbia (1,900-2,100 pairs), Montenegro (1,156 pairs) and FYRO Macedonia (1,130 pairs). The lowest numbers of breeders were recorded in the Czech Republic (297 pairs), Bosnia-Herzegovina (171 pairs), Slovakia (99 pairs) and Austria (65 pairs). Great Cormorants were not recorded breeding in Slovenia, Kosovo and Albania in 2012.

From 2006 to 2012 noticeable increases were recorded in Greece (by 2,400 pairs, 53 %), Italy (by 1,800 pairs, 83 %), Serbia (by 1,100 pairs, 113 %) and Switzerland (by 800 pairs, 385 %). Declines between 2006 and 2012 were rec-

orded in Montenegro (by 850 pairs, -42 %), Croatia (by 830 pairs, -38 %) and Hungary (by 540 pairs, -17 %).

Black Sea and Sea of Azov - P. c. sinensis. This area includes Belarus, the countries that border the Black Sea and several Russian regions between the Sea of Azov and the Caspian Sea as well as Georgia, Azerbaijan and Armenia. Some parts of this area were not well covered during the survey, and in some cases estimates were thus based on older data.

It is estimated that this area had between 138,000 and 153,300 breeding pairs in 2012. The most important breeding areas were the Danube Delta, the Ukrainian coast of the Black Sea, the coasts of the Sea of Azov and the Volga Delta in the northwest end of the Caspian Sea. The vast majority of breeders were found in colonies with >1,000 nests.

At the national level, the Russian areas between the Sea of Azov and the Caspian Sea had the highest number of breeding pairs (60-68,000 pairs), followed by Ukraine (46,500 pairs) and Romania (13-15,000 pairs). Other countries with more than 2,000 breeding pairs were Turkey (6,500-8,500 pairs), Georgia (4,000-6,000 pairs), Belarus (3,250 pairs) and Bulgaria (2,775 pairs). Lower breeding numbers were estimated for Azerbaijan (1,000-2,000 pairs) and Moldova (700-1,500 pairs). Armenia had 10 breeding pairs.

From 2006 to 2012 numbers declined markedly in the north-western area of the Black Sea (the Danube Delta in Romania and Ukraine as well as the Ukrainian coasts of the Black Sea and the Sea of Azov): from 84,200 pairs in 2006 to 49,200 pairs in 2012 (-42 %). In the Danube Delta alone breeding numbers declined by 11,100 pairs (-51 %). Increases from 2006 to 2012 were reported in both Belarus (by 1,100 pairs, 52 %) and Bulgaria (by 790 pairs, 39 %). Breeding numbers had also increased in the Russian areas between the Sea of Azov and the Caspian Sea but the extent of increase could not be estimated with certainty.



A Great Cormorant of the *sinensis* sub-species incubating in the Vorsø colony, Denmark. Photo: Kim Biledgaard.

Introduction

There continues to be considerable interest in Great Cormorants and their numbers in the Western Palearctic. This is partly due to the fact that increasing populations of the continental sub-species *Phalacrocorax carbo sinensis* have been seen as a factor putting pressure on fisheries, aquaculture and angling activities. The interactions between the birds' activities and human interests have created various types of social and socioeconomic conflicts. On the basis of the concerns from the various social and economic sectors affected, the European Parliament requested in 2008 the European Commission to take action.

A basic understanding of the status, trends and distribution of the Great Cormorant throughout the Member States is fundamental to resolving management and conflict issues within the European Union. Based on this, the Commission decided as one of its actions to hire a contractor to collaborate with the IUCN/Wetlands International Cormorant Research Group and the individual countries, in order to monitor the breeding and wintering population of cormorants in Europe. It was decided that determining the population size and distribution of the continental *sinensis* sub-species should be given priority.

For these reasons, the IUCN/Wetlands International Cormorant Research Group (hereafter referred to as the Cormorant Research Group) has collaborated with the European Commission project 'CorMan' through its contractor, Aarhus University in Denmark and the NERC Centre for Ecology & Hydrology in the United Kingdom, in order to organize Pan-European counts of breeding colonies and of cormorants in their wintering areas. The name 'CorMan' is an acronym for the project 'Sustainable Management of Cormorant Populations' (Service Contract No. 07-0307/2010/575579/SER/B3, see also http://ec.europa.eu/environment/nature/cormorants/home_en.htm).

The Cormorant Research Group and the EC contractors formed a specific counts project '*Cormorant counts in the Western Palearctic*' to undertake this work. The Western Palearctic covers all of Europe (including the Russian Federation west of the Ural Mountains), North Africa and the northern and western parts of the Middle-East (Fig. 1.1 in Chapter 1). Ideally the project aimed to obtain information about the size of all breeding colonies of Great Cormorants in the Western Palearctic in 2012. However, the primary focus was to obtain information from the breeding areas of the birds that occur in the EU Member States on the European continent.

The counts project has been led by representatives from the Cormorant Research Group and the EC contractor. The project has provided support and guidance for all countries participating on how to organize and monitor the breeding colonies so that by the end of the project finally all results obtained could be aggregated on a Pan-European level. A project home page and a web-based tool offering facilities for entering count results directly and denoting the location of the counted site using Google Maps were also developed. Area Coordinators from the overall project were responsible for establishing and maintaining contact with National Coordinators in each country. All countries in the Western Palearctic participated in the organized counts and/or supplied the counts project with the best and most recent data available in case there were areas which could not be covered in 2012 or 2013. From the autumn of 2012 onwards all National Coordinators were invited to present major results from their national count in a collation of national reports (Bregnballe et al. 2013) and/or in the present report. The vast majority of National Coordinators welcomed this opportunity and prepared a national chapter. The authors received a national report template and an example to provide direction on structure and relevant information. As one of the CorMan contractors, Aarhus University provided support throughout the process of preparing the national chapters. Standard figures were developed to illustrate the distribution of the breeding population. All text, figures and maps were approved by the authors and reviewed by at least two members of the Counts Steering Group before being checked by a referee from the Department of Bioscience, Aarhus University and a referee from the Danish Centre for Environment and Energy (DCE), Aarhus University.

Based on the counts of nests in breeding colonies in 2012 and/or 2013, the present report provides the most recent information available about the size and distribution of the Great Cormorant population in the Western Palearctic.

The first chapter gives an overview of the results from the counts of breeding colonies. It includes descriptions of (a) the coverage achieved, (b) the methods applied and (c) the development in breeding numbers since 2006 when a similar Pan-European count of breeding colonies took place. The results from this earlier count have been presented by the Cormorant Research Group in a leaflet (Wetlands International Cormorant Research Group 2008), as a paper (Bregnballe et al. 2011) and in one of the Final Reports from the 'INTERCAFE' COST Action (van Eerden et al. 2012).

The following chapters, 2-38, are national or sub-national reports from 32 of the countries that participated in the counts. These national presentations include descriptions of the total size of the breeding population and provide information about numbers, sizes and distribution of breeding colonies. Information is also given about the extent of human intervention in the breeding colonies. Some of the countries have also published results in national journals, newsletters or in reports, and references to these more detailed descriptions are given at the end of each national report.

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One of the Great Cormorant sub-colonies at Hirsholmene in northern Kattegat, 2008. Denmark. Photo: Kjeld T. Pedersen.

1 Status of the breeding population of Great Cormorants *Phalacrocorax carbo* in the Western Palearctic in 2012

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Summary

The breeding colonies of Great Cormorants in the Western Palearctic were monitored in 2012. The national surveys were conducted in coordination with, and facilitated by, a project called '*Cormorant counts in the Western Palearctic*' lead by the European Commission project 'CorMan' undertaken in collaboration with the IUCN/Wetlands International Cormorant Research Group. Highest priority was given to ensure that all breeding colonies were counted in areas where the continental sub-species *P. c. sinensis* was breeding. Priority was also given to assess the size of the breeding populations in countries from where Great Cormorants migrate to EU Member States.

The species was found breeding in all countries in Europe except Luxembourg, Monaco, Portugal, Slovenia, Kosovo and Albania. Most of the breeding colonies were small with fewer than 100 nests. However, around 50 % of all the breeders of the continental sub-species *P. c. sinensis* were recorded breeding in large colonies with more than 1,000 nests. The largest colony was found in Ukraine and had 18,000 nests.

The highest densities of breeders of the *sinensis* sub-species were found around the Baltic Sea (167,700 pairs) with most in Sweden (40,600 pairs), Denmark (27,250 pairs), Poland (26,600 pairs) and Germany (22,550 pairs). High densities were also found in several areas around the Black Sea, the Sea of Azov and the Caspian Sea (138,000-153,300 pairs). Major breeding areas outside these regions were The Netherlands (23,600 pairs), France (8,700 pairs), Greece (7,000 pairs) and Italy (3,900 pairs).

Since 2006, when a similar Pan-European count took place, breeding numbers of the continental sub-species have increased by 17,000 pairs along the eastern coast of the Baltic Sea and decreased by 15,000 pairs in the western part of the Baltic Sea. Along the North-East Atlantic coasts noticeable increases in breeding numbers were reported in Spain (by 1,300 pairs), inland areas in France (by 2,500 pairs) and the Norwegian coast of Skagerrak (by 1,100 pairs). In central Europe and the Mediterranean, noticeable increases were recorded in Greece (by 2,400 pairs), Italy (by 1,800 pairs), Serbia (by 1,100 pairs) and Switzerland (by 800 pairs). In this part of Europe, declines were recorded in Montenegro (by 850 pairs), Croatia (by 830 pairs) and Hungary (by 540 pairs). A marked decline of 11,000 pairs was recorded in the Danube Delta.

The breeding population of the more marine Atlantic sub-species *P. c. carbo* was estimated to total 42,500 pairs, with the highest number breeding in Norway (19,000 pairs). Breeding numbers of this sub-species had declined in Norway (by around 9,000 pairs over six years) and a similar trend was apparent along the coast of the United Kingdom (UK). Numbers had either increased or remained stable along the coast of Iceland, the Barents Sea (the Russian Federation) and Ireland, as well as in inland areas in the UK and France.



Aerial view of a Great Cormorant colony in the Volga Delta in the north-western part of the Caspian Sea. Photo: G. Rusanov .

Introduction

There is a continous and considerable interest in Great Cormorants and their numbers in Europe. This is partly due to the fact that increasing populations of the continental sub-species *Phalacrocorax carbo sinensis* have been seen as a factor putting pressure on fisheries, aquaculture and angling activities. The interactions between the birds' activities and human interests have created various types of social and socioeconomic conflicts. On the basis of the concerns from the various social and economic sectors affected, the European Parliament requested in 2008 the European Commission to take action.

Following a consultation meeting with the Member States in 2009, the European Commission decided that one action should aim at increasing current knowledge about the status, trends and distribution of the Great Cormorant throughout Europe. This information was judged as being fundamental for some of the processes aimed at resolving management and conflict issues within the European Union. As a consequence, the Commission hired a contractor to collaborate with the IUCN/Wetlands International Cormorant Research Group and a large number of individual countries, in order to monitor the breeding and wintering population of cormorants in Europe.

The IUCN/Wetlands International Cormorant Research Group (hereafter referred to as the Cormorant Research Group) subsequently collaborated with the European Commission project 'CorMan' through its contractor, Aarhus University in Denmark and the NERC Centre for Ecology & Hydrology in the United Kingdom, in order to organize Pan-European counts of breeding colonies and of cormorants in their wintering areas. The name 'CorMan' is an acronym for the project 'Sustainable Management of Cormorant Populations', Service Contract No. 07-0307/2010/575579/SER/B3, see also http://ec.europa.eu/environment/nature/cormorants/Background-and-Activities.htm). The Cormorant Research Group and the EC contractors formed a specific counts project '*Cormorant counts in the Western Palearctic*' to undertake this work.

The Western Palearctic covers all of Europe (including the Russian Federation west of the Ural Mountains), North Africa and the northern and western parts of the Middle-East (Fig. 1.1). Ideally the project aimed to obtain information about the size of all breeding colonies of Great Cormorants in the Western Palearctic in 2012. However, the primary focus was to obtain information from the breeding areas of the birds that occur in the EU Member States on the European continent.

Up to 2006 it was commonly believed that two sub-species of the Great Cormorant *Phalacrocorax carbo* bred in the Western Palearctic. However, Marion & Le Gentil (2006) found genetic evidence for the existence of a third sub-species (see 'Material and methods'). The two sub-species that are traditionally treated separately are the so-called 'Atlantic' sub-species *P. c. carbo* and the so-called 'continental' one *P. c. sinensis*. The Atlantic *carbo* sub-species is mainly found breeding on rocky cliffs and unvegetated islands on exposed marine coasts in Ireland, the UK, northwest France, Iceland, Norway and along the Barents Sea coast in the Russian Federation. The continental *sinensis* sub-species breed in trees and on the ground mainly along shallow coasts and at inland waters. The continental sub-species has a much wider distribution than the Atlantic sub-species. Within the Western Palearctic it breeds throughout most of continental Europe, from Finland in the

Figure 1.1. The parts of Europe, North Africa and the Middle-East included in the Western Palearctic. The border of the Western Palearctic follows that of Snow & Perrins (1998).



north to Spain in the south and west over most of continental Europe to the Caspian Sea in the east. The breeding distribution of *P. c. sinensis* extends further east of the Western Palearctic, across Asia to Japan.

Determining the population size and distribution of the continental subspecies was given highest priority because it is mainly the *sinensis* birds that cause conflicts with fisheries in continental Europe (van Eerden et al. 1995, Carss 2003).

Based on counts of nests in breeding colonies in 2012 and/or 2013, the present report provides the most recent information available about the size and distribution of the Great Cormorant population in the Western Palearctic.

All countries in the Western Palearctic participated in the organized counts and/or supplied the counts project with the best and most recent data available in case there were areas which could not be covered in 2012 or 2013. The majority of the countries have published their results both at national levels and as chapters in this report.

This first chapter of this report gives an overview of the major results from the monitoring of the breeding population. Recent trends in population development in the different parts of Europe are described and discussed in relation to a comparison with breeding numbers recorded during the Pan-European count of 2006. The overall results from that previous Pan-European count of breeding colonies were presented by the Cormorant Research Group in a leaflet (Wetlands International Cormorant Research Group 2008), as a paper in the proceedings from the 7th International Conference on Cormorants (Bregnballe et al. 2011) and in one of the Final Reports from the 'INTERCAFE' COST Action (van Eerden et al. 2012).

Material and methods

Areas of priority

Based on information on migration routes from different parts of the breeding range of the Great Cormorant, priority was given to all European countries located west of the Russian Federation and Turkey. As a result the area of priority also includes Belarus and Ukraine because these countries have breeders that migrate to various parts of Europe (Kostiushyn et al. 2011). Furthermore, priority was given to ensure counts of nests in breeding colonies in the Russian part of the Gulf of Finland and Kaliningrad as many of the Great Cormorants in these Russian regions are thought to migrate to EU Member States (A. Gaginskaya unpubl.). Coverage of the breeding colonies in Turkey, the Russian areas between the Sea of Azov and the Caspian Sea, west Kazakhstan, Georgia and Azerbaijan was given lower priority because few of these birds probably migrate to EU Member States (Gavrilov & Gavrilov 2005, Gavrilov & Gistsov 1978, A. Gavrilov, A. Abayev & S. Zaripova unpubl.).

With highest priority given to obtaining the most accurate information possible on the size and distribution of breeding populations of the continental *sinensis* sub-species, less effort was invested in ensuring full coverage of the coastal colonies of the *carbo* sub-species in Ireland and the UK.

Handling of sub-species

The question of sub-species is likely to be more complicated than the traditional separation between the nominate Atlantic race *P. c. carbo* and the continental race *P. c. sinensis*. Marion & Le Gentil (2006) found genetic evidence for the existence of a third sub-species which they named *P. c. norvegicus*. This sub-species was found mainly in Norway (north of Skagerrak) and in Brittany (France), but the sub-species also occurred in colonies near to the sea in Sweden, Denmark and The Netherlands. For simplicity, and because of the limited number of colonies for which information about *P. c. norvegicus* exist, we only distinguished between *carbo* and *sinensis* birds so, in effect, some *P. c. norvegicus* birds will be grouped with *carbo* ones and some (but fewer) will be grouped with *sinensis* ones.

We distinguish between *carbo* and *sinensis* in the present overview, partly because of their different conservation needs and the tendency of birds to occur in inland waters in continental Europe outside the breeding season. It was not difficult to distinguish between the two sub-species when the populations were small because the sub-species generally lived in different environments, particularly during the breeding season. However, as the populations of both sub-species expanded they started to breed in mixed colonies, particularly in inland colonies in England and in coastal and inland colonies in France (e.g. Marion 1995, Goostrey et al. 1998, Winney et al. 2001, Marion & Le Gentil 2006, Newson & Marchant 2007, Newson et al. 2004, Newson et al. 2007, Newson et al. 2013). With a few exceptions, the extent to which *carbo* and *sinensis* are breeding in mixed colonies in other countries is unknown.

The relative proportion of the two sub-species can vary extensively between colonies located relatively close to each other, and the *sinensis/carbo* proportions are also known to have changed over the years in individual colonies (e.g. Marion & Le Gentil 2006, S.E. Newson pers. comm.). This makes it very difficult to accurately determine the population sizes for the two subspecies. Colonies in Ireland, along the coast of the UK, in Iceland, in Norway (north of Skagerrak) and along the White Sea coast in Russia, were treated as

if only *carbo* (incl. *norvegicus*) were breeding. For inland colonies in the UK we assumed that 34 % of the breeders belonged to the sub-species *carbo* in 2012, based on the gular pouch angle criteria (Newson et al. 2013, S.E. Newson unpubl.). There have been no records of sub-species composition from genetic data in the French breeding colonies since 2002. To keep it simple, we assumed that the coastal colonies in France contained 80 % *carbo* (incl. *norvegicus*) and 20 % *sinensis*, and for the inland colonies in France we assumed that 20 % were *carbo* (incl. *norvegicus*) and 80 % were *sinensis*; these assumptions were based on published data (Marion & Le Gentil 2006) and unpublished data (L. Marion unpubl.).

Organisation of counts

The counts project 'Cormorant counts in the Western Palearctic' was led by representatives from the Cormorant Research Group and the EC contractor through a 'Counts Steering Group'. The Counts Steering Group divided the Western Palearctic into four counting areas and 1-2 Area Coordinators were designated to each. Key people were contacted in countries throughout the Western Palearctic in order to recruit qualified people to coordinate the counts in each of their respective countries. Furthermore, a large number of organisations, institutions and other key people likely to have knowledge about the occurrence of breeding Great Cormorants in their countries were contacted. The contact with National Coordinators and other key people began in 2011 and continued until March 2014. Area Coordinators from the overall project were responsible for establishing and maintaining contact with the National Coordinators.

Guiding and facilities

The counts project provided support and guidance for all countries, informing them about the aim of the project, how to count breeding colonies and how to report count results so that all results obtained could be aggregated on a Pan-European level at the end of the project. The counts project also prepared relevant material and communicated this to the National Coordinators so they could distribute this further as they judged relevant. This material included (a) a guide describing the preferred methods for counting at Great Cormorant colonies, (b) an Excel and pdf form recommended to be completed for each colony counted, (c) an Excel form to insert the numerical conclusion at the national level as well as the basic information for each of the individual colonies counted, (d) a description of how the data from each country would be stored, published and made available to others through and after the end of the project.

A project home page and a web-based tool was also developed, offering facilities for the National Coordinators and individual counters for entering count results directly and for denoting the location of the counted sites using Google Maps (for details, see <u>http://www.cormocount.eu</u>). The website provided access to instructions for the counting of breeding colonies in English, Russian and Danish. The project home page was further used to communicate the progress of the counts project to the National Coordinators and individual counters, and to present summaries of results from completed counts.

It was recommended that all countries monitored their breeding population by first identifying all the sites known to have had breeding cormorants in recent years, and then ensure that each of these sites was visited during the breeding season in order to locate all active breeding colonies and count all nests occupied by breeders. National Coordinators were asked to report their national results as soon as they were sure that all relevant count results had been collated and checked for possible mistakes.

Information provided to National Coordinators recommended that a colony was defined as a group or groups of nests that were located within 2,000 m of one another (Bregnballe et al. 2012). Groups of nests located within 2,000 m of one another should be referred to as 'sub-colonies'. A single nest was sufficient to be termed a 'colony' as long as it was not located within 2,000 m of other nests. This recommendation was followed by some but not all countries because National Coordinators were free to use other definitions of what constituted a colony if they had their own national protocol.

Instructions to counters

A practical guide was developed for people who would conduct counts of nests in breeding colonies (referred to as 'colony counters'). The guide was made available through the project home page and some of the National Coordinators distributed the guide to the colony counters. The guide recommended that observers counted apparently occupied nests, defined as nests in use and sufficiently completed to hold one or more eggs (Bregnballe et al. 2012).

It was further recommended that counts were made at the time of the breeding season when the maximum numbers of nests were likely to be occupied. However, for tree nesting colonies, colony counters were also advised to count the nests before extensive leaf-burst, as visibility decreases with expanding foliation. The ability of observers to count at the time when nest numbers peaked was in some cases constrained by other factors such as incomplete knowledge about exactly when in the season nest numbers might be expected to peak, partly because this may vary from year to year. In planning the time of a nest count, the colony counters also had to take into account that the number of nests tends to reach a maximum later in the season in newly-founded colonies than it does in older ones. Finally, some colony counters were forced to count at a suboptimal time because of other duties or poor weather conditions on the day when the count was planned.

The guide included instructions for counting at both ground nesting and tree nesting colonies. To minimise disturbance in the ground nesting colonies colony counters were advised to attempt to count nests from outside the colony. Entering colonies was avoided if it was possible to count the nests from one or more suitable vantage points. Where possible, the nest contents were recorded in order to obtain a general assessment of the stage of the breeding cycle when the count took place. When entering a colony was necessary to ensure precision of the nest count, colony counters were advised to carefully keep track of which nests were counted by making a map using features in the landscape possibly combined with the use of sticks or spray paint to mark the areas where nests had been counted. Some colony counters minimized the duration of disturbance by using a tape recorder to record information during the count and/or by having two or three people counting simultaneously.

It was recommended that where repeated counts were carried out (at different dates during the breeding season), the highest number of nests should be used to describe the size of the colony. A few *sinensis* colonies and a large number of the *carbo* ones along open, rocky coasts were counted by taking photographs of the colony from the air (particularly in Iceland and Norway). Nests were counted either from a computer screen or from large prints of the photos.

As a minimum, colony counters were asked to report the number of apparently occupied nests, the name and location of the colony (coordinates in decimal degrees) and their own contact details. Colony counters were also given the opportunity to provide additional information about: (a) the locality (name of locality, geographical coordinates, protection), (b) the colony and its surrounding habitat (type of fishing water, minimum distance to fishing water, type of colony, species of nesting trees, % breeding on the ground, occurrence of predators), (c) the counting method (date of count and method), (d) clutch size, brood size and breeding success, (e) the occurrence of disturbance, and (f) the occurrence of management.

All colony counters were asked to report their results immediately after the count took place.



A female parent delivers a meal to one of its chicks, Vorsø, Denmark. Photo: Kim Biledgaard.

Precision of counts

In most of the countries the locations of the majority of the breeding sites were known in advance. This resulted in a high probability of obtaining up to date information about the size of all the countries' breeding colonies. Most colonies were counted once around the time of the season when nest numbers were at their maximum.

Despite the large and often conspicuous nests of this species, counts of apparently occupied nests are not necessarily straightforward. However, in many of the colonies the nests were fairly easily counted. For a minority of breeding colonies it was necessary to estimate the number of occupied nests in certain parts of the colony, e.g. due to insufficient visibility from the observation points. Some colony counters reported a minimum and a maximum number of nests in the colony they counted. A few National Coordinators used these lower and upper values and provided a range of nest numbers when reporting on total numbers in their country. Other Coordinators decided to use the mean number of nests when a minimum and a maximum were given. As advised, the National Coordinators used the largest count for colonies where there was more than one count for a particular site and year.

The number of nests present at the time of the season when nest numbers reach their maximum will, in most cases, be lower than the total number of nests actually built in the colony. Thus nests may disappear before, and new nests may be built after, the peak in nest numbers (Harris & Forbes 1987).

Furthermore, the number of pairs that have attempted to breed will also usually be higher than the number of apparently occupied nests at the time of the season when nest numbers reach their maximum (Harris & Forbes 1987, Walsh et al. 1995). Thus nests built by pairs that give up early in the season are frequently taken over by new pairs, and some breeders may not initiate breeding until after the nests have been counted.

Handling of count results by National Coordinators

Each of the National Coordinators was responsible for keeping contact with the colony counters and ensured that they delivered the results from their counts. Some National Coordinators recommended that their colony counters reported their results directly into the CormoCount platform, having each colony counter as a registered user. Others entered their results in a predesigned form (editable pdf) or in the Excel form.

Having collated all the data, the National Coordinators checked all information for any obvious mistakes and identified and resolved possible uncertainties. After a final quality check the National Coordinator passed on the results to the relevant Area Coordinator. For the majority of colonies only the minimum information required (colony location and number of nests) was provided.

When reporting the national results, National Coordinators were asked to report the actual number of nests and colonies, to describe the coverage of the count at the national level, and to give a best estimate of the total number of colonies and nests in the country or region. In a few countries or regions total breeding numbers were difficult to estimate because some areas had not been covered in 2012 or in another recent year. In these cases 'best estimates' were made from knowledge about the presence of wetlands and potential breeding areas. Within the area of priority, this was done for Moldova, central and western Romania and for some small regions of Ukraine. Outside the area of priority best guesses were made for some regions in the Russian Federation, Georgia, Azerbaijan and Turkey.

National reports

From the onset of the counts project, the National Coordinators were encouraged to publish their results. Many of the Coordinators and their coworkers have done so (see references in individual chapters in this report). Furthermore, from the autumn of 2012 onwards all National Coordinators were invited to present major results from their national count in a collation of national reports (Bregnballe et al. 2013) and/or in the present report.

Handling of data for overview

For the present overview we use, for simplicity, the terms "number of nests" or "number of breeding pairs" as a reference to the number of "apparently occupied nests" which was the unit used by counters when reporting their results to the National Coordinator.

For a number of countries we also received results from counts of colonies conducted in 2013, but this overview chapter, only includes data from the 2012 counts, unless data only exist for other years.

Based on the information provided by the National Coordinators, who had also described their use of estimates to compensate for incomplete coverage, national overview tables were made giving the essential information on coverage, the number of colonies and the size of the national or regional breeding population.

The information on the geographical location of each breeding colony and the number of apparently occupied nests for each colony were organized in a database. From this we extracted the information needed to present total numbers breeding within 50×50 km squares for most of the Western Palearctic covered by the 2012 count.

To explore the frequency distribution of colony sizes and the distribution of the overall populations in relation to colony sizes, data on colony sizes were extracted for the *carbo* and *sinensis* sub-species. For colonies with *carbo* breeders, only data from Norway and Iceland were used. For *sinensis* colonies, breeding data were used from countries located west of the borders to Russia and Turkey (though colonies in the Russian areas along the Baltic Sea were included).

To provide an overview of recent population trends, the results from the 2012 count were compared with results of similar counts that took place in 2006. Comparisons were made for areas with equal coverage.

Definitions of areas

The section of the Western Palearctic where Great Cormorants are breeding was divided into four major areas. Some regions in Russia and the western part of Kazakhstan which belong to the Western Palearctic and have breeding Great Cormorants were not included in this status for breeding numbers in the Western Palearctic.

The four areas were defined in relation to large and connected bodies of water: The North-East Atlantic Ocean, the Baltic Sea, the Mediterranean and the Black Sea. The border of each of the four areas is shown in Fig. 1.2 and the areas were defined as follows:

Area I. Includes the countries with coasts along the North-East Atlantic Ocean, except for Germany and Denmark.

Area II. Includes the countries along the Baltic Sea including the Russian part of the Gulf of Finland and Kaliningrad. Germany and Denmark were grouped under this area as the majority of the breeders in these countries are found close to the Baltic Sea and not close to the North Sea.

Area III. Includes countries in central Europe and the central and eastern Mediterranean.

Area IV. Includes Belarus, the countries that border the Black Sea, and several Russian regions between the Sea of Azov and the Caspian Sea, as well as Georgia, Azerbaijan and Armenia. The western part of Kazakhstan (at the



Figure 1.2. Overview of the countries where breeding colonies of Great Cormorants were counted as part of the current project and borders defining the four areas used to present the results of the counts. In the United Kingdom complete coverage of all inland colonies (*sinensis* and *carbo* sub-species) was obtained but not all coastal colonies with breeders of the *carbo* sub-species have been covered in recent years. Colonies along parts of the Irish coast were covered. In Romania complete coverage was obtained along the lower Danube and in the Danube Delta, but estimates from other regions were based on data from earlier years. Counts were carried out in the larger regions in Azerbaijan and the Russian Federation between the Sea of Azov and the Caspian Sea. For Moldova, Georgia and Turkey limited information was available relating to breeding numbers in 2012 or 2013. For further information on coverage, see Tables 1.2-1.5.

northern coast of the Caspian Sea) also belongs to the Western Palearctic but was not included in area IV. The same is true for a number of inland regions of Russia west of the Ural Mountains.

Coverage reached within the Western Palearctic

The primary focus was to obtain updated knowledge about breeding numbers of the sub-species *sinensis* within Areas I, II, III and the western part of Area IV which included Belarus, Ukraine, Moldova, Romania and Bulgaria (Fig. 1.2). Almost complete coverage was achieved for 2012. There are four circumstances which resulted in incomplete coverage inside the area of priority in 2012 as follows:

(1) Colonies missed and not recorded/counted. Whilst considerable effort was made to obtain complete coverage of all parts of each of the countries where cormorants could be expected to breed, it is highly likely that in some coun-

tries some colonies and breeding attempts were missed, as these colonies were not known or discovered in 2012. The National Coordinators strived to obtain clear knowledge about the completeness of the coverage of the breeding colony counts in their own countries. In general National Coordinators reported that all known colonies were counted and that any possible colonies not covered during the counts are likely to have been newly-established ones with small numbers of nests. However, some countries have regions which are rarely visited by ornithologists or other people who can be expected to report on the presence of breeding colonies of cormorants if discovered. This seems to have been the case for at least some parts of Romania, Belarus and Ukraine. Attempts have been made to correct for incomplete coverage in these countries.

(2) Data from earlier years. In some countries and regions, not all colonies could be counted in 2012. In these situations, data from the most recent count was used to estimate the current (i.e. 2012) national breeding population. This was the case in 2 out of 53 colonies in the UK, 8 out of 135 colonies in France, 20 out of 169 colonies in Sweden, 5 out of 54 colonies in Poland, 2 out of 46-50 colonies in Italy, 6 out of 11 colonies in the Stavropol region in Russia, 1 out of 13 colonies in Greece, 1 out of 20 colonies in Belarus and 1 out of 29 colonies in Romania.

(3) Areas not covered. In Romania counts of breeding colonies were carried out only on the lower River Danube and the Danube Delta. As a result, a best estimate of breeding numbers in the remainder part of the country was provided by the National Coordinator based on counts and information collected in earlier years (not necessarily in a year immediately prior to 2012). In Ukraine it was not possible to survey a small number of locations where breeding took place in previous years (locations in the Danube Delta, Dnieper Delta and northeast and northwest Ukraine). Therefore the National Coordinator provided an estimate of breeding numbers in these areas based on information from earlier years. In Moldova counts were carried out in three colonies, but for several parts of the country no information existed about the occurrence of breeding of Great Cormorants. Consequently, best guesses on breeding numbers were made for these uncovered areas.

4) Counts in 2013. In Bosnia-Herzegovina, FYRO Macedonia and Romania counts could not be conducted in 2012 and so were carried out in 2013 instead.

A secondary aim of the project was to obtain coverage in the eastern and southern part of area IV, i.e. in the part of Russia located between the Sea of Azov and the Caspian Sea as well as Georgia, Azerbaijan, Armenia and Turkey (see Fig. 1.2). In Georgia very limited information was retrieved through personal communication with local ornithologists (2 colonies) and for Azerbaijan a rough estimate of the total breeding population is presented based on counts from various years and parts of the country. For Armenia we obtained comprehensive information about the breeding populations. For Turkey information was obtained from a group of ornithologists (J.P. Tavares, O. Onmus, K. Erciyes and K. Boyla) who collated historical information and conducted counts of 20 breeding colonies during 2011-2013. However, a number of potential breeding areas here could not be covered.

The extent of coverage varied in the Russian regions located between the Sea of Azov in the west and the Caspian Sea in the east. Complete or almost complete coverage in or around 2012 was obtained for the Krasnodar region and for the Volga delta (Astrakhan region). By combining counts from previous years, population estimates were made for the Rostov, Stavropol and Kalmykia regions as well as for the southern part of the Volgograd region. Suitable nesting habitats also exist within the Astrakhan (along the Volga River) and Dagestan regions, but it was not possible to obtain detailed information on breeding numbers in these regions (V. Belik pers. comm.). A full survey of the breeding colonies of Great Cormorants in the Don River Delta (Rostov region) is planned for 2014 (N. Lebedeva pers. comm.).

A third aim of the present project was to obtain counts of breeding colonies of the Atlantic sub-species *P. c. carbo* in Iceland, Norway, north-western Russia, the UK, Ireland and France. Complete coverage was obtained for Iceland, France and the inland colonies in the UK. In Norway the *carbo* breeding population was estimated based on counts carried out in individual colonies which took place in various years between 2007 and 2013 (Chapter 25). The majority of colonies (83 %, 132 out of 160) were counted between 2011 and 2013. The use of data from different years to reach an estimate of the total breeding population along the coast of Norway was not ideal because Great Cormorants may abandon a colony within a few years and move to another location if breeding conditions deteriorate in the original colony (e.g. Røv 1994). However, movements are usually to neighbouring or at least not very distant potential breeding sites, and the coverage of the colonies present within the individual regions in Norway was in most cases carried out in one year (S.-H. Lorentsen pers. comm.).

For the north-western coast of Russia, ornithologists made a best estimate of breeding numbers for the Barents Sea coast of the Kola Peninsula as well as for Kandalaksha Bay and Onega Bay in the White Sea, although coverage was not complete and for some sites data on breeding numbers were obtained prior to 2012. For the eastern part of the Barents Sea coast in the Russian Federation no information was obtained, and as a result a best guess of the breeding population was determined by one of the Area Coordinators based on studies of satellite photos.

For the UK and Ireland there has not been sufficient coverage to provide a precise updated overview of the total breeding numbers in the coastal colonies. However estimates were made from annual or almost annual counts of a number of coastal colonies (S.E. Newson, S. Newton and N. Tierney pers. comm.).

Information about the coverage within individual countries is provided in Tables 1.2-1.5 as well as in the national and regional chapters provided in this report.

We refer to the counts (and estimates) made in relation to the Pan-European survey in 2012 and/or 2013 as "the 2012 count", even though the colonies in some countries were counted in 2013 or in a year immediately prior to 2012.

The term 'breeding pairs' is used for breeding numbers within larger areas – at national as well as at sub-national levels – whereas the term 'nests' is mainly used when refering to breeding colonies. However, numbers always refer to the counted or estimated number of 'apparently occupied nests'.

Results

Overall numbers

The breeding population of Great Cormorants in the Western Palearctic had reached around 406,000-421,000 breeding pairs by 2012 according to the counts and estimates used in the present survey; this estimate excludes some regions in Russia and the western part of Kazakhstan. It was estimated that about 42,500 of the breeding pairs belonged to the Atlantic sub-species *carbo* and around 371,000 pairs to the continental sub-species *sinensis*.

Iceland, France and Norway – where complete coverage was reached through counts of all colonies – had 26,700 breeding pairs of *carbo* and it was estimated that a total of approximately 16,300 pairs of this Atlantic subspecies were breeding in Ireland, the UK and in the Russian Federation (along coasts of the Barents Sea and the White Sea).

The population size given for the continental sub-species *sinensis* is the average value of the estimate ranging between 363,300 and 378,600 breeding pairs (this estimate does not include all breeding areas within the Western Palearctic because no data on breeding numbers were collated for certain Russian inland regions located west of the Ural Mountains and for the western part of Kazakhstan which is also included in the Western Palearctic).

It is further estimated that around 294,000 pairs of the sub-species *sinensis* were breeding inside the area of the Western Palearctic that covers the countries located west of the western borders of Russia and Turkey (range 291,600-295,900 pairs; this sector of the Western Palearctic includes Kaliningrad and the Russian part of the Gulf of Finland). The 28 EU Member States had 214,500 of the breeding pairs of *sinensis* in Europe in 2012.

The Russian regions between the Sea of Azov and the Caspian Sea were estimated to have a breeding population of between 53,500 and 61,000 pairs.

The counted and estimated numbers breeding in the four areas shown in Fig. 1.2 are given in Table 1.1 for each the two sub-species of the Great Cormorant.



A male Great Cormorant bringing seaweed to its nest in the Danish Vorsø colony. Photo: Kim Biledgaard. **Table 1.1.** The estimated and counted numbers of breeding pairs of Great Cormorants *P. c. carbo* (area I) and *P. c. sinensis* (Areas I-IV) breeding in 2012 in the Western Palearctic. The four Areas are defined in Fig. 1.1 alongside denoting the coverage during the 2012 count. National breeding numbers are presented in Tables 1.2-1.5. A small proportion of the number given under 'Counted' are based on estimates.

		Number of breeding pairs in 2012		
Sub-species	Area	Overall estimate	'Counted'	
P. c. carbo ¹	I. North-East Atlantic Ocean	42,500	34,004	
<i>P. c. sinensis</i> ¹				
	I. North-East Atlantic Ocean	36,900	36,811	
	II. Baltic Sea	167,700	167,689	
	III. Central Europe and Central and Eastern Mediterranean	20,900	20,839	
	IV. Black Sea, Sea of Azov and NW Caspian Sea	138,000-153,300	125,108	

¹For France it is assumed that 80% of the breeders in the coastal colonies belonged to the *carbo* sub-species and 20 % to the *sinensis* sub-species whereas for the inland colonies the assumptions were 20 % *carbo* and 80% *sinensis* (Marion & Le Gentil 2006, L. Marion unpubl.). For the UK it is assumed that 66 % of those breeding in inland colonies belonged to the *sinensis* subspecies and that 34 % belonged to the *carbo* sub-species (cf. S.E. Newson unpubl.).

Overall distribution of P. c. carbo

The Atlantic sub-species carbo was recorded breeding in Russia, Norway, Iceland, Ireland, the UK and France. Most of the breeders were found along the coast of Norway (ca. 19,000 pairs). The UK was the second most important breeding area for this sub-species. Although there has not been any simultaneous and complete survey of the British coastal Great Cormorant colonies since around 2000, it was estimated that 8,545 pairs nested along the coast of the United Kingdom in 2005 (Newson unpubl.; see also Bregnballe et al. 2011). Analyses of trends suggested that there has been a decline in coastal breeding numbers in the UK after 2005 (INCC and S.E. Newson unpubl.; trends based on annual counts of a variable number of the coastal colonies). The trends suggest that the coasts of the UK had around 6,500 breeding pairs in 2012 (S.E. Newson & T. Bregnballe unpubl.). Ireland was not fully covered in 2012, but based on annual surveys of 13 colonies that held 59 % of breeding numbers recorded during the 'Seabird 2000' survey, it was estimated that Ireland had around 4,400 breeding pairs in 2012 (S. Newton unpubl.). In France, carbo totalled about 3,000 breeding pairs in 2012, 55% of them on the coasts and 45% in inland colonies. Iceland had 4,772 breeding pairs. The total number of breeding pairs along the Barents Sea and White Sea coasts of the Russian Federation is unknown (E. Tolmacheva pers. comm.). However, some colonies have been counted in recent years, especially those located on islands in the White Sea. It is estimated that the Barents Sea and White Sea coasts had around 3,900 breeding pairs in 2012, but the estimate is uncertain due to incomplete coverage.

Overall distribution of P. c. sinensis

The largest numbers of breeding Great Cormorants of the continental subspecies were found in the countries bordering the Baltic Sea (167,700 breeding pairs) and the Black Sea, the Sea of Azov and the Caspian Sea (>138,000 breeding pairs, Table 1.1). Breeding numbers were lower in the countries along the North-East Atlantic Ocean (36,900 pairs; Germany and Denmark not included in this area). The area of central Europe and the central and eastern Mediterranean held a breeding population of 20,900 breeding pairs.

Great Cormorants were found breeding in all the countries included in Areas I-IV (Fig. 1.2) except for Luxembourg, Monaco, Portugal, Slovenia, Kosovo and Albania.

The numbers of breeding pairs of Great Cormorants in each of the countries in 2012 are given in Tables 1.2-1.5.

The overall distribution of the breeding population of Great Cormorants is shown in Fig. 1.3. Breeding numbers are shown as the total numbers within 50×50 km grid cells. It is evident that the largest concentrations were found:

- Near shallows, lagoons and large river deltas along the Baltic Sea coasts.
- Around lake IJsselmeer in The Netherlands.
- In the large deltas of the rivers Danube (Romania and Ukraine), Dnepr (Ukraine) and Volga (Russia)
- Along the Black Sea and Sea of Azov coasts of Ukraine and Russia
- The Volga Delta in the north-western part of the Caspian Sea.

Besides these areas, moderately high numbers of breeding Great Cormorants of the *sinensis* sub-species were found near coasts, estuaries, lagoons, as well as near to large rivers and large lakes in inland areas in Sweden, Belarus, Poland, Germany, The Netherlands, France, Spain, northern Italy, Hungary, Croatia, Serbia, Montenegro, FYRO Macedonia, northern Greece, Romania and Ukraine (Fig. 1.3, Tables 1.2-1.5).

The areas within the Western Palearctic that are not included in the present survey, but have breeding populations of Great Cormorants of the continental sub-species are a number of inland regions in the Russian Federation located west of the Ural Mountains and the western most part of Kazakhstan (only the western part of Kazakhstan is located inside the Western Palearctic according to Snow & Perrins 1998). Updated information on breeding numbers in these areas could not be gathered for this project. However, information about occurrence of breeding of Great Cormorants in earlier years in these regions is given in Belik (2008), Gavrilov & Gavrilov (2005), Kuzmenko & Fedotov (2005), Numerov (2013) and Shevchenko et al. (1993). These references document that Great Cormorants breed periodically on lakes in the steppes between the Volga and Ural Rivers in the Western Kazakhstan (Shevchenko et al. 1993). These lakes periodically dry up, but are filled with water again after winters with plentiful snow. The most recent published record of breeding in this area refers to 1996 (Belik 2008). Great Cormorants also occur numerously in summer on the wide Voronezh reservoir, but colonies have not been found yet (Numerov 2013). In 2004 a colony with 15-20 nests was (for the first time) found in the western part of the Bryansk Region, near the border to Belarus (Kuzmenko & Fedotov 2005).

The following countries, located outside Europe but inside the Western Palearctic, currently do not have breeding populations of the continental subspecies of Great Cormorants: Morocco, Algeria, Tunisia, Libya, Egypt, Jordan, Israel, Lebanon, Syria and Iraq (S. Jbour, L. Marion, G.A. Nabegh, T. Qaneer, M.A. Salim & M. Smart pers. comm.). Breeding does, however, occur in Iran (just east of the Western Palearctic) – at least three colonies were reported around 2003 (Barati & Balmaki 2005).



Figure 1.3. Distribution of the breeding population of Great Cormorants in the Western Palearctic in 2012 presented in 50 x 50 km grid cells. The black line denotes the border of the area covered by the overall survey of the breeding population. The map only includes breeding colonies where all or some of the breeders belonged to the *sinensis* sub-species. Breeders in the following areas where only the *carbo* sub-species is breeding (or at least very few of the breeders are likely to be *sinensis* birds) are not included: Ireland, the coast of the UK, Iceland, Norway (north of Skargerrak) and the Barents Sea coast of the Russian Federation. The map does not show the distribution of breeders in Turkey, Armenia, Azerbaijan, Georgia, parts of Russia, Moldova and the central and western part of Romania because of incomplete coverage in some of the regions in these countries.

Distribution in relation to colony size

P. c. carbo. Among the breeding colonies in Norway and Iceland most colonies (61 %) were small with 1-100 nests (Fig. 1.4A), but the majority of the birds (73 %) bred in colonies with 101-1000 nests (Fig. 1.4B). The three colonies with 1001-1300 nests (all located in Norway) had 12 % of all the *carbo* breeders present in Norway and Iceland. Røv (1994) has found evidence to suggest that the area of shallow water and the spatial distribution of adjacent colonies (but not their sizes) regulated the sizes of the Norwegian colonies.

The colonies in the White Sea in Russia (not included in Fig. 1.4) were generally small with <100 nests, but a single colony had 420 nests (this colony consisted of 3 sub-colonies located <2,000 m apart).

P. c. sinensis. Breeding colonies with 1-100 nests made up 57 % of all the breeding colonies recorded in Europe west of the border to Russia and Turkey (Fig. 1.5A). However, these colonies contained only 0.5 % of the total breeding population (Fig. 1.5B). The largest colonies with >1,000 nests made up 5 % of all existing colonies (Fig. 1.5A) but had 50 % of all the breeders (Fig. 1.5B).

It is evident that breeding *sinensis* birds generally nested in larger colonies than did breeding *carbo* birds (compare Figures 1.4B and 1.5B).



Figure 1.4. The Great Cormorant colonies of the *P. c. carbo* sub-species in Iceland (n=49) and Norway (n=153) in 2012 in terms of (A) size distribution and (B) distribution of the breeding population in relation to colony size.



Figure 1.5. The Great Cormorant colonies of the *P. c. sinensis* sub-species in parts of the Western Palearctic in 2012 in terms of (A) size distribution and (B) distribution of the breeding population in relation to colony size. The 1,059 breeding colonies included were located in countries west of the border to Russia and Turkey, although Kaliningrad and the Russian part of the Gulf of Finland are included. Some of the colonies had breeders of both sub-species.

Distribution of P. c. sinensis within areas

Area I - North-East Atlantic. This area includes the countries along the North-East Atlantic Ocean, but not Germany and Denmark. The area had 784 breeding colonies in which all or some of the breeders were *sinensis*. A fairly high proportion (39 %) of the breeders nested in colonies with 1-250 nests (Fig. 1.6A).

The highest numbers of breeders (23,600 pairs) were found in The Netherlands (Table 1.2) which had 64 % of all the breeders in Area I. This country also had the six largest colonies, of which five were situated at Lake IJsselmeer. These six colonies had 27 % of all the breeders in Area I (Fig. 1.6A).



Figure 1.6. Distribution of the 2012 breeding population of Great Cormorants in relation to colony size in each of the areas I-IV. For Area IV data are only included for colonies located west of the border to Russia and Turkey. Only data from colonies where all or some of the breeders were *sinensis* birds are included. The proportions are calculated from the following number of breeding pairs: 40,709 pairs in Area I, 166,714 in Area II, 20,594 in Area III and 60,894 in Area IV. Be aware that the y-axes are not drawn to the same scale and that the highest interval of colony sizes differs between Areas.

Table 1.2. The number of breeding pairs (assumed occupied nests) in the countries along the North-East Atlantic Ocean (Area I), given per country or region within a country. The numbers given relate to counts carried out in 2012 unless otherwise stated. 'Estimated total' is the estimated total number of nests in the country or region. 'Counted' refers to the total number of nests counted. In countries or regions where the coverage was believed to be complete, the 'Estimated total' and the 'Counted' figures are equal. In countries or regions where the coverage was incomplete, an estimate of the national or regional population was provided by the National Coordinator. In Norway and France, '*P. c. carbo*' refers to the *P. c. carbo* and *P. c. norvegicus* sub-species combined. The estimated totals given in parentheses are best guesses based on incomplete coverage.

Country	Number	of nests	_	
Region	Estimated		No. of	
Sub-species	total	Counted	colonies	Remarks and sources
Iceland P. c. carbo	4,772	4,772	49	Chapter 18 (Gardarsson & Jónsson 2014)
Russia P. c. carbo				
Area A at Barents Sea coast of the Kola Peninsula	550	523	3	Area A covers 'Seven Islands', 'Gavrilovsky Archipela- goes' and 'Maly Ainov Island'. Using counts during 2010- 2013. Largest colony on Maly Ainov with 420 nests in 2010. R.V. Plotnikov, I.P. Tatarinkova, N.Ju. Ivanenko & T.D. Paneva (unpubl.)
Uncovered areas of Barents Sea coast, Kola Peninsula	1,400			Estimate by M.V. Melnikov & T.D. Paneva (based on unpubl. data)
Kandalaksha Bay, White Sea	100	60	3	Chapter 30 (Bianki et al. 2014)
Onega Bay, White Sea	50		4	Chapter 32 (Tertitski et al. 2014). Using counts during 2008-2013
White Sea to Novaya Zemlya	(1,800)			Estimated total is a best guess by T. Bregnballe
Norway				
North of Skagerrak <i>P. c. carb</i> o	19,000		153	Chapter 25 (Lorentsen 2014a). Using counts during 2007-2013
Skagerrak P. c. sinensis	2,500	2,434	14	Chapter 24 (Lorentsen 2014b).
United Kingdom				
Coastal colonies <i>P. c. carbo</i>	(6,500)		(65)	Estimated total is a best guess by T. Bregnballe based on data from S.E. Newson (unpubl.)
Inland colonies <i>P. c. carbo</i> & <i>P. c. sinensis</i>	2,809	2,809	53	Chapter 11 (Newson et al. 2014). England: 2,362 nests in 48 inland colonies; Wales: 58 nests in 1 inland colony; Scotland: 389 nests in 4 inland colonies (2 counted in 2000). Northern Ireland: no inland breeders
Ireland P. c. carbo	4,366		>13	Estimated from trends of 13 colonies (representing 59% of the Seabird 2000 population estimate) monitored 2000-2012. S. Newton (pers. comm.). All colonies are coastal
The Netherlands P. c. sinensis	23,556	23,556	78	Chapter 23 (van Rijn 2014)
Belgium P. c. sinensis	1,584		28	Chapter 5 (Devos & Paquet 2014)

Monaco	0		0	L. Marion (pers. comm.)	
Luxembourg	0		0	P. Lorge (pers. comm.)	
France P. c. carbo & P. c. sinensis					
Total	8,673	8,624-8,722	135	Chapter 14 (Marion 2014). Using counts from 2009 or 2011 for 9 colonies	
Inland colonies	6,629	6,581-6,676	108		
Coastal colonies	2,044	2,042-2,046	27		
Spain P. c. sinensis	1605	1,527-1,595	21	Chapter 36 (Molina 2014) SEO/BirdLife	
Portugal	0		0	V. Encarnacao (pers. comm.)	

The UK had 2,809 breeding pairs in inland colonies of which 1,854 were estimated to be *sinensis*. The largest inland colony in the UK with *sinensis* breeders was located in England and had 226 nests.

The three other countries in Area I with breeding Great Cormorants were Spain (1,605 pairs), Belgium (1,584 pairs) and Norway (2,500; only the most southern part of Norway had *sinensis* breeders). Maximum colony sizes in these countries were: 823 nests for southern Norway, 614 for Spain and 213 nests for Belgium.

Area II - Baltic Sea. The Baltic Sea countries had 505 breeding colonies altogether and each of the countries around the Baltic Sea had between one and seven colonies with >1,000 nests (including each of the two Russian regions). The highest breeding numbers were along the coasts of Sweden, Finland, Estonia, Kaliningrad, Poland, North Germany and Denmark (Fig. 1.3, Table 1.3).

Cliff breeding Great Cormorants on the west coast of Sardinia, Italy 2011. Based on a genetic study of Great Cormorants in Europe, Marion & Le Gentil (2006) suggested that this Sardinian colony could be a relict because some of the breeders belonged to the *carbo* subspecies (see also Chapter 19). Photo: Egidio Trainito.



Overall, the majority of breeders (84 %) were in colonies with >250 nests, and the 37 largest colonies with 1,001-9,100 nests held 46 % of Area II's breeders (Fig. 1.6B). The largest colony (9,075 nests) was located in the estuary of the Deyma River in Kaliningrad and the second largest (6,450 nests) was Kąty Rybackie, located on the Baltic Sea coast of Poland (nest numbers in this Polish colony had declined from 11,600 nests in 2006).

Area III - Central Europe and the Central and Eastern Mediterranean. This area had 131-135 breeding colonies in 2012 and 40 % of the breeders were found in four colonies with >1,000 nests (Fig. 1.6C). The largest colony had 4,730 nests and was located at Kerkini Lake in northern Greece. The three other large colonies had 1,000-1,200 nests and were found in FYRO Macedonia, Montenegro and Italy.

At the national level, Greece had the highest number of breeding pairs (ca. 7,000 pairs), followed by Italy (ca. 3,900 pairs) and Hungary (ca. 2,700 pairs). Five other countries – Switzerland, Croatia, Serbia, Montenegro and FYRO Macedonia – had 1,000-2,100 breeding pairs each (Table 1.4).

Table 1.3. The number of breeding pairs (assumed occupied nests) in the Baltic Sea (Area II), given per country or region within a country. The numbers given relate to counts carried out in 2012 unless otherwise stated. Great Cormorants breeding in this area belong to the *sinensis* sub-species. However, it cannot be excluded that also some birds of the *carbo* sub-species breeds in colonies of *sinensis* in for example Denmark. See also Table 1.2 for further explanations.

	Number	of nests		
	Estimated		No. of	
Country / region	total	Counted	colonies	Remarks and sources
Sweden	40,598	40,598	169	Chapter 37 (Engström & Wirdheim 2014). Using counts for 20 colonies prior to 2012
Finland	17,258	17,258	41	Chapter 13 (Rusanen 2014)
Russia - Gulf of Finland	4,605	4,605	7	Chapter 28 (Gaginskaya et al. 2014)
Estonia	13,000	12,880	18	Chapter 12 (Rattiste 2014)
Latvia	3,106	2,634	9	Chapter 20 (Millers 2014)
Lithuania	3,200	3,004	6	Chapter 21 (Dagys & Zarankaité 2014). A small number of colonies (Nemunas river delta) were not surveyed due to limited access
Russia - Kaliningrad	9,535	9,535	2	Chapter 29 (Grishanov et al. 2014)
Poland	26,600	25,473	54	Chapter 26 (Bzoma et al. 2014). Using counts from 2010 for 5 colonies
Germany	22,550	22,550	150	Chapter 15 (Kieckbusch 2014)
Denmark	27,237	23,237	64	Chapter 10 (Bregnballe et al. 2014)
Area IV - Belarus and Black Sea-Caspian Sea. This area includes Belarus, the countries that border the Black Sea, several Russian regions between the Sea of Azov and the Caspian Sea as well as the countries Azerbaijan, Armenia and Georgia.

The total number of breeding colonies in area IV is not known, but exceeded 270 colonies. The area around the Black Sea, the Sea of Azov and the Volga Delta had the largest colonies. One colony, located on the Obithochnaya Spit on the Ukrainian coast of the Sea of Azov, had 18,000 nests (surveyed using aerial photography). This colony seems to be the largest breeding colony ever recorded in the Western Palearctic.

Table 1.4. The number of breeding pairs (assumed occupied nests) in Central Europe and the central and eastern Mediterranean (Area III), given per country or region within a country. The numbers given relate to counts carried out in 2012 unless otherwise stated. Great Cormorants breeding in this area belong to the *sinensis* sub-species. See also Table 1.2 for further explanations.

	Number of nests			
	Estimated		No. of	
Country	total	Counted	inted colonies	Remarks and sources
Switzerland	1,037	1,037	13	Chapter 38 (Keller & Müller 2014)
Italy	3,914	3,865-4,016	46-50	Chapter 19 (Volponi & CoroMoNet.it 2014). Counts from 2011 used for 2 colonies
Austria	65	65	3	Chapter 3 (Parz-Gollner et al. 2014)
Czech Republic	297	297	7	Chapter 9 (Musil & Musilova 2014)
Slovakia	99	99	2	Chapter 35 (Ridzoň et al. 2014)
Slovenia	0	0	0	L. Božič (pers. comm.)
Croatia	1,331	1,331	2	Chapter 8 (Mikuska et al. 2014)
Hungary	2,661	2,641-2,681	22	Chapter 17 (Szinai 2014)
Bosnia-Herzegovina	171	171	1	Chapter 6 (Sjeničić & Kotrošan 2014). Using counts from 2013
Serbia	1,900-2,100	1,873-1,987	20	Chapter 34 (Šćiban et al. 2014)
Kosovo*	0		0	
Montenegro	1,156	1,156	1	Chapter 22 (Vizi 2014)
Albania	0	0	0	Chapter 2 (Jorgo & Jorgo 2014)
FYRO Macedonia	1,130	1,130	1	Breeding in 1 colony at Golem Grad Island, Prespa Lake in 2013. O. Avramoski (pers. comm.). Colony had 2,500-3,000 occupied nests during 2008-2010 (Velevski et al. 2010)
Greece	6,978	6,963	13	Chapter 16 (Kazantzidis 2014). Counts from 2010 used for 1 colony

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

In Bulgaria, Romania, Belarus and Ukraine (i.e. in the west and north end of the Black Sea) 64 % of the breeders were found in colonies with >1,000 nests (Fig. 1.6D). The number of small and medium sized colonies in this part of Area IV was low compared with Areas I-III: 17 % of the breeders were found in colonies with 1-500 nests in area IV versus 31-53 % in Areas I-III.

The most important breeding areas in Area IV were the Danube Delta, the Ukrainian coast of the Black Sea, the coasts of the Sea of Azov and the Volga Delta in the northwest end of the Caspian Sea (Table 1.5). The Danube Delta had approximately 10,600 breeding pairs of which 8,800 pairs were located on the Romanian side and 1,800 pairs on the Ukrainian side. The area along the Ukrainian coast of the Black Sea and the Ukrainian and Russian coasts of the Sea of Azov held 64-66,000 breeding pairs. Of these 38,600 were found in Ukraine and 21-23,000 on the Russian side of the Sea of Azov (V. Belik. pers. comm.). The Volga Delta had at least 28,000 breeding pairs on the Russian side.

The following describes current knowledge about breeding numbers and distribution in the parts of area IV where some (but not all) breeding colonies were counted in the present study.

Moldova. Very little is known about the breeding population of Great Cormorants in Moldova. However, 8 colonies have been located during recent surveys of wetlands and nests were counted in three of these in 2012-2013 (80, 90 and 179 nests; E. Baltag, V. Ajder & P. Constantin pers. comm.). Combining this with knowledge about the presence of wetlands, the current best guess is that Moldova had between 700 and 1,500 breeding pairs around 2012 (V. Ajder, T. Bregnballe, B.J. Kiss & V. Kostiushyn unpubl.).

Turkey. The following description is based on a report under preparation by J.P. Tavares, O. Onmus, K. Erciyes and K. Boyla. Nests were counted or estimated in 20 breeding colonies in one or more breeding seasons between 2011 and 2013 and this ensured an almost complete coverage of the breeding colonies in the Aegean region, along the Mediterranean coast, in central Anatolia and along the eastern Black Sea. Total number of nests counted ranged from 5,003 to 6,753. Based on these counts, and historical data and literature references, a preliminary estimate is that Turkey currently has around 6,500-8,500 breeding pairs (J.P. Tavares & T. Bregnballe unpubl.).

The majority of breeding colonies are concentrated in a few sites in west and northwest Turkey and along the Black Sea coast. The two colonies in Manyas Lake (Marmara region, north-west Turkey), had a total of 3,000-4,000 pairs and are the largest breeding colonies in the country. Breeding numbers have been increasing in several parts of Turkey but the species has declined or disappeared as a breeding bird in several sites in central Anatolia and in the eastern regions of Turkey. There has been a significant drainage and/or degradation of many inner Anatolian wetlands in the last few decades, and this has apparently reduced their value for the Great Cormorant.

Armenia. Great Cormorants were recorded breeding in Lake Sevan up until the 1950s when water levels dropped due to drainage (M. Ghasabyan pers. comm.). The species returned to the lake as a breeder in 2011: 2 nests in 2011, 10 nests in 2012 and 18 nests in one colony in 2013 (M. Ghasabyan pers. comm.).

Table 1.5. The number of breeding pairs (assumed occupied nests) in Belarus, around the Black Sea and between the Black Sea and the Caspian Sea (Area IV), given per country or region within a country. The numbers given relate to counts carried out in 2012 unless otherwise stated. Great Cormorants breeding in this area belong to the *sinensis* sub-species. See also Table 1.2 for further explanations. The estimated totals given in parentheses are only best guesses based on incomplete coverage.

Country	Number o	of nests				
	Estimated		No. of			
Region	total	Counted	colonies	Remarks and sources		
Belarus	3,250	1,849-2,914	20	Chapter 4 (Samusenko 2014). Using counts from local residents for 4 colonies and counts from 2011 for 1 colony		
Ukraine						
Total	46,500	44,597	36	Chapter 39 (Kostiushyn et al. 2014)		
Inland	4,197		16			
Black & Azov Sea coasts	38,642		17			
Danube Delta	1,758		3			
Uncovered areas and regions	1,900					
Moldova	700-1,500	349	≥8	8 colonies known and 3 counted in 2012-2013 (80, 90 and 179 nests). The estimated total is a best guess by V. Ajder, T. Bregnballe, B.J. Kiss & V. Kostiushyn		
Romania						
Total	13-15,000	11,306	29	Chapter 27 (Kiss et al. 2014). Using counts from		
Danube delta	8,804	8,804	19	2013. Additional information provided through		
River Danube (excl. delta)	>2,502	2,502	2,502 >10	Bulgarian national census for 1 colony (I. Nikolov		
Uncovered areas and regions	1,700-3,700	,700		pers. comm.)		
Bulgaria	2,775	2,658-2,677	15-20	Chapter 7 (Nikolov et al. 2014)		
Russia - from Sea of Azov to Ca	aspian Sea					
Total	60-68,000		70-80	Regional estimate by V. Belik, T. Bregnballe & J. Lynch (unpubl. 2014)		
Rostov	≥6,790	6,790	5	Using counts from 2006, 2010, 2011 & 2012. Largest colonies on the Tsimlyansky Reservoir (3,500 nests) and in the Don River Delta (2,477 nests) V. Belik (pers. comm.).		
Volgograd (southern part)	≥972	972	4	Counts from 2009, 2012 & 2013. Largest colony on the Tsimlyansky reservoir (500-1,000 nests). V. Belik (pers. comm.)		
Krasnodar	18-20,000	16,928	17-19	Chapter 31 (Lokhman et al. 2014)		
Stavropol	≥866	866	11	Using counts from 2011 and 2013. Largest colony in Chograi Reservoir, East Manych River (150 nests). L. Malovichko (pers. comm.)		
Kalmykia	2,500-3,000	1,350-1,850	>7	V. Muzaev (pers. comm.)		
Volga Delta, Astrakhan	≥28,123	28,123	11	Chapter 33 (Rusanov et al. 2012)		
Uncovered areas and regions	(3,000-8,000)			Estimate by V. Belik, T. Bregnballe & J. Lynch (un- publ.)		
Azerbaijan	1,000-2,000		>15	Sultanov (2011)		

Georgia	(4,000-6,000)	120	>2	Using counts for 2 colonies in 2012 (Z. Javakhishvili pers. comm.). For 2006 B. Japoshvilli estimated c. 7,000 pairs. Guess for total numbers in 2012 by T. Bregnballe
Armenia	10		1	Breeding in Armenia up until the 1950s. Returned as a breeder (3 nests) in 2011 at Lake Sevan where numbers increased to 10 nests in 2012 and 18 nests in 2013 (Mamikon Ghasabyan pers. comm.)
Turkey	(6,500-8,500)	3,500	>20	20 colonies with ca. 3,500 nests recorded in 2011- 2013 (J.P. Tavares pers. comm.). Guess for total numbers in 2012 by J.P. Tavares & T. Bregnballe (unpubl.)

Azerbaijan. The following description of the situation in Azerbaijan is based on material collated by E. Sultanov (pers. comm.). Surveys in the years up to, and including, 2011 have provided information about 15 breeding colonies. Findings suggest that the country's breeding population varies between years, ranging from 1,000 to 2,000 pairs, depending on water levels (no general up- or downward trend has been recorded). Almost 95 % of the breeders were recorded on islets along the coast of, or on oil platforms in, the Caspian Sea. Smaller colonies were recorded inland along large rivers, at water reservoirs and lakes, such as the large Mingechaur Lake. The species is not protected in Azerbaijan and is regularly exposed to persecution, including in the breeding areas outside nature reserves.

Georgia. Information has been obtained for two small breeding colonies in Georgia. An earlier estimate suggested that Georgia had around 7,000 breeding pairs in 2006, but this was a very uncertain estimate (B. Japoshvili pers. comm., Bregnballe et al. 2011). The current best-guess for total breeding numbers in 2012 is 4,000-6,000 breeding pairs (T. Bregnballe unpubl.)

Russia between Sea of Azov and Caspian Sea. It is estimated that the Russian regions between the Sea of Azov, the Black Sea and the Caspian Sea held about 70-80 colonies around 2012, and that numbers amounted to at least 60,000 breeding pairs and possibly up to 68,000 pairs (Table 1.5, V. Belik, T. Bregnballe & J. Lynch unpubl.). The area includes the regions of Krasnodar, Rostov, Volgograd (south), Stavropol, Kalmykia, Astrakhan, Dagestan and a number of smaller regions.

The Krasnodar Region on the east side of the Sea of Azov had 17-19 breeding colonies with 18-20,000 breeding pairs. Over half (54 %) of the breeding population was located in the Yeisk estuary which also had the largest colony in the Krasnodar region with 6,700 nests.

The Don River Delta (Rostov region) at the north-eastern coast of the Sea of Azov had 2,477 pairs in 2 colonies (V. Belik. pers. comm.).

The inland areas between the Sea of Azov and the Caspian Sea had a number of small and (a few larger) breeding colonies on major rivers, lakes and reservoirs. The largest numbers of inland breeders were found on the Tsimlyansky reservoir, located on both sides of the border between the Rostov and Volgograd regions; 4,265 pairs in three colonies. The Manych Lake system, on the border of the Rostov and Stavropol regions, contained 465 pairs in six colonies. Two small colonies with a total of 290 pairs were located on the East Manych River in the Stavropol region.

The Volga Delta at the north-western coast of the Caspian Sea (in the Russian region of Astrakhan) had 11 breeding colonies with a total of approximately 28,000 breeding pairs in 2012.

It is estimated that the un-surveyed areas and regions in Russia between the Sea of Azov and the Caspian Sea had a breeding population of 3,000-8,000 pairs.

Changes in breeding numbers of P. c. carbo from 2006 to 2012

The overall breeding population of the Atlantic sub-species in the Western Palearctic has apparently declined from 2006 to 2012. In the areas covered by counts in both 2006 and 2012 numbers dropped by ca. 8,800 pairs, corresponding to a decline of 23 % (Table 1.6). The increase from 2006 to 2012 recorded in Iceland, along the Barents Sea coast of the Kola Peninsula, in the UK and in France amounted to approximately 2,360 pairs. Overall, however, this increase was smaller than the decline of approximately 11,000 pairs in Norway.

Breeding numbers in Iceland increased by ca. 640 pairs. In inland colonies in the UK numbers increased by ca. 340 pairs and in inland colonies in France by ca. 580 pairs (the exact increase in numbers in the UK and France is uncertain because of the mixed breeding of *carbo* and *sinensis*; see also Material and methods regarding sub-species composition).

Analyses of trends in the UK, based on annual counts of a variable proportion of the coastal colonies, indicate that the coastal section of the breeding population declined between 2006 and 2012 (maybe by as much as 30 % which would correspond to a decline of almost 2,600 pairs; NERC and S.E. Newson unpubl.). Monitoring of coastal colonies in Ireland (representing 59 % of the 'Seabird 2000' project population estimate) showed a 4% decline from 2000 to 2012 (S. Newton pers. comm.). The data available suggested that the breeding population along the coast of the Barents Sea and the White Sea in the Russian Federation increased between 2006 and 2012, but the coverage is incomplete.

Changes in breeding numbers of P. c. sinensis from 2006 to 2012

The overall breeding population of the *sinensis* sub-species in the Western Palearctic has changed only little from 2006 to 2012. In the areas covered by counts in both 2006 and 2012 numbers declined from 328,400 to 309,400 breeding pairs corresponding to a decline of -6 %. Considering the increases have taken place in some of the areas for which data are too incomplete to make comparisons between 2006 and 2012 (Turkey and some of the regions between the Sea of Azov and the Caspian Sea), it is judged that overall breeding numbers are likely to have changed by only a few percent between 2006 and 2012.

In the area of Europe located west of Russia, Belarus, Ukraine and Turkey, and for which we have data from both 2006 and 2012, numbers increased by 3,300 pairs (+1.4 %; from 232,500 pairs in 2006 to 235,800 pairs in 2012; Kaliningrad and the Russian part of the Gulf of Finland included).



Figure 1.7. Changes in breeding numbers in 29 countries and 3 regions in Russia from 2006 to 2012. The black line denotes the border of the area covered by the overall survey of the breeding population. The large arrow in Norway shows the change in breeding numbers of birds belonging to the *carbo* sub-species whereas the smaller arrow in southeast Norway refers to the breeding population of the *sinensis* sub-species. Breeding numbers are indicated by arrows if numbers increased or decreased by more than 10% from 2006 to 2012. Changes by less than 10 % are indicated by diamonds. The size of the arrows and diamonds refer to the number of breeding pairs in 2012. Some countries and regions of Romania and Russia are not included due to incomplete coverage in 2006 and/or in 2012.

This overall 'stability' in breeding numbers in the Western Palearctic covers large differences in trends among countries. The country by country trends are shown in Fig. 1.7 and are described below together with descriptions of the overall trends within each of the four areas. *Area I - The North-East Atlantic.* In this area, *sinensis* breeding numbers increased by ca. 4,800 pairs corresponding to a 15 % increase from 2006 to 2012. This was primarily due to increases in Norway (the Skagerrak region), France (inland colonies only) and Spain. The increases amounted to 1,162 pairs (+87 %) in southern Norway, 2,046 pairs (+56 %) in France (for assumptions regarding sub-species composition see Material and methods) and 1,300 pairs (+453 %) in Spain. The estimated increase of *sinensis* in inland colonies in the UK amounted to 281 pairs (+18 %; for assumptions regarding sub-species composition see Material and methods). Breeding numbers in The Netherlands increased by only 80 nests (+0.3 %) from 2006 to 2012.

Area II - Baltic Sea. The overall breeding numbers in the Baltic Sea increased by ca. 2,000 pairs from 2006 to 2012, but because of the large number of breeders in 2006 this corresponds to an increase of only 1 %. Despite this minor change in overall breeding numbers, there were noticeable differences in individual Baltic countries in the development in numbers from 2006 to 2012.

Moderate to marked declines were evident in the western Baltic countries: a decline of 10,800 pairs (-28 %) in Denmark, of 3,400 pairs (-8 %) in Sweden and of 800 pairs (-3 %) in Germany.

Except for a decline of 490 pairs (-13 %) in Lithuania, marked increases were reported in the eastern parts of the Baltic Sea: An increase of 11,500 pairs (+199 %) in Finland, 2,600 pairs (+520 %) in Latvia, 790 pairs (+21 %) in the Russian part of the Gulf of Finland, 700 pairs (+6 %) in Estonia, 1,000 pairs (+12 %) in Kaliningrad and 870 pairs (+3 %) in Poland.

Area III - Central Europe and the Mediterranean. The overall number of breeding pairs in central Europe and the central and eastern Mediterranean increased by 3,900 pairs (+25 %) from 2006 to 2012 (FYRO Macedonia not included). The largest increases were recorded in Greece (2,400 pairs, +53 %), Italy (1,770 pairs, +83 %), Serbia (1,060 pairs, +113 %) and Switzerland (820 pairs, +385 %). Conversely, the largest declines were recorded in Montenegro (840 pairs, -42 %), Croatia (825 pairs, -38 %) and Hungary (540 pairs, -17 %).

Area IV - Belarus and Black Sea-Caspian Sea. A comparison could be made for the western and northern areas of the Black Sea where at least 56 % of the breeders were found in 2012. A decline of -26 % was recorded in this area (Table 1.6). V. Kostiushyn (pers. comm.) raised doubts about the precision of some of the counts of breeding colonies in 2006 and suggested that the decline in breeding numbers might have been overestimated.

Breeding numbers in the Danube Delta had declined from 21,700 pairs in 2006 to 10,560 pairs in 2012 (-51 %). The largest decline was recorded on the Romanian side of the delta (a decline of 7,650 pairs), but it was also noticeable on the Ukrainian side (a decline of 3,500 pairs).

Table 1.6. The numbers of Great Cormorants of the two sub-species *carbo* and *sinensis* recorded breeding in 2006 and 2012 in four Areas in the Western Palearctic. Data are presented only where comparable information was available for both 2006 and 2012 (see notes for countries and regions excluded/included). Areas are defined in Fig. 1.2 alongside coverage of the 2012 count.

Sub-species		Number of breeding pairs		
Area	Name of Area	2006	2012	
P. c. carbo	I. Atlantic Sea and North Sea ^{1,2}	38,470	29,638	
P. c. sinensis	I. Atlantic Sea and North Sea ²	31,991	36,811	
	II. Baltic Sea ³	165,650	167,689	
	III. Central Europe and Central and Eastern Mediterranean ⁴	15,792	19,709	
	IV. Black Sea and Sea of Azov ⁵	114,557	85,216	

¹The comparison does not include breeding numbers for Ireland, coastal areas of the UK, Kandalaksha Bay in the White Sea and the coastal areas from the White Sea to Novaya Zemlya. The comparison represents 69.0 % of the *carbo* and 100 % of the *sinensis* counted in Area I in 2012.

²For France it is assumed that the coastal colonies in both 2006 and 2012 had 80 % *carbo* and 20 % *sinensis* whereas vice versa for the inland colonies. For United Kingdom it is assumed that 72 % of those breeding in inland colonies in 2006 belonged to the *sinensis* sub-species whereas the proportion was assumed to be 66 % in 2012 (cf. S.E. Newson unpubl.).

³The comparison represents 100 % of breeders counted in this area in 2012.

⁴The comparison does not include breeding numbers for Albania and FYRO Macedonia. The comparison represents 94.6 % of all breeders counted in this area in 2012.

⁵The comparison includes breeding numbers for Belarus, Ukraine, Romania (Danube Delta and lower Danube), Bulgaria, the Rostov and Krasnodar regions in Russia. This comparison represents at least 56 % of the estimated total numbers of breeders in this region in 2012.

Increases were reported in both Belarus (by 1,100 pairs, +52 %) and Bulgaria (790 pairs, +40 %). Breeding numbers have also increased in most of the Russian areas between the Sea of Azov and the Caspian Sea. It has been estimated that this area had 35-55,000 breeding pairs in 2000-2003 (V. Belik pers. comm.) compared to 60-68,000 pairs in 2012 (Table 1.5). Overall numbers in Turkey have also increased over the last 20 years or more (J.P. Tavares unpubl.).

Discussion

Coverage

Although the *P. c. carbo* sub-species is the nominate race of the Great Cormorant, it is not the most widespread sub-species of the species in Europe nor the one most frequently/widely involved in conflicts with fishery (and other) interests (van Eerden et al 1995, Carss 2003). As such, counting this subspecies and recording its geographical distribution were not the main priority for the present study (see also Material and methods). The coverage achieved by the counts presented here for Atlantic *carbo* birds was not sufficiently complete to allow a precise estimate of the total number of this subspecies breeding in the Western Palearctic. This is primarily because of the incomplete coverage of the coastal breeding colonies in Ireland, the UK and the Barents Sea in the Russian Federation. Furthermore the exact numbers of breeding *carbo* are not known for colonies where both *carbo* and *sinensis* birds are breeding.

For *sinensis* birds, despite missing information from some of the countries and regions located outside the priority counting area, the present survey provides a very accurate overview of the overall size and distribution of the breeding population in the Western Palearctic.

In almost all countries the vast majority of *sinensis* colonies were covered in either 2012 and/or 2013, with only a small number of colonies being counted in a previous year(s). For three of the countries (Romania, Bosnia-Herzegovina & FYRO Macedonia) in the area of priority, counts of colonies had to be postponed to 2013. Overall we judge that the use of information from counts carried out in earlier years is likely to have had only a very small effect on the precision of the so-called status of Great Cormorants in 2012 referred to in the present study.

Overall distribution of the breeding population

P. c. carbo. Counts have documented that Norway is the most important breeding area for this sub-species, despite marked declines in several parts of country. The other areas which have been important for many decades, and continue to be so, are the coasts of the UK, Ireland and Iceland. The sub-species is increasingly dispersing to inland areas in France and breeds alongside *sinensis*. For example, some of the inland colonies in France with *carbo* breeders are located more than 180 km from the coast (L. Marion unpubl.).

P. c. sinensis. The continental sub-species has continued its dispersal in Europe. In 2012 there were only six countries in Europe that did not have a breeding population of Great Cormorants. The geographical expansion has been most evident in the eastern part of the Baltic Sea and in central and southern Europe.

A very large proportion of the European sinensis population has been recorded breeding in large and very large colonies holding more than 1,000 nests up until the early 1990s (e.g. Zijlstra & van Eerden 1991). The proportion of the population that breeds in these very large colonies has gradually decreased as new areas have been colonised (van Eerden & Gregersen 1995, Bregnballe 2009). In general, birds breeding in new colonies, many of which are located in inland areas, have apparently not had a similarly high amount of fish available close to their colony, as was the case for birds that nested in colonies along coasts and on islets in the Baltic Sea and in The Netherlands (see van Eerden et al. 2012). The establishment of new breeding colonies has also in some regions been followed by a gradual move of breeders from the very large colonies to colonies of more moderate size (van Eerden & Gregersen 1995, van Eerden & van Rijn 2003, van Rijn & van Eerden 2007, Hénaux et al. 2007, Bregnballe 2009). This has led to a more even geographical distribution of the breeding population and to an increase in the proportion of birds breeding in medium sized colonies (van Eerden & Gregersen 1995, van Eerden & Rijn 2003, Bregnballe & Gregersen 1997, Bregnballe 2009).

Despite the gradual redistribution of the breeding population from very large colonies to more medium sized ones, 50 % of the breeders are still found in breeding colonies with more than 1,000 nests. The tendency for breeders to concentrate in very large colonies is most evident in the Baltic Sea and in the Black Sea (Fig. 1.6).

Population development of P. c. carbo

The population of the *carbo* birds increased slowly during the 1970s and 1980s, only a few percent per annum, and the increase did not continue in all breeding areas during the 1990s (e.g. Debout et al. 1995, Røv et al. 2003). The European breeding population of *carbo* was estimated at 41,000 pairs around the second half of the 1980s until 1992 (however, the numbers for Iceland refers to counts conducted in 1975; Debout et al. 1995).

The Western Palearctic breeding population of *P. c. carbo* can be estimated to have had around 53,600 pairs in 2006 and 42,500 pairs in 2012. For 2006 we used the estimate by Bregnballe et al. (2011) after having adjusted the proportion of *carbo* birds in the mixed colonies (according to revised estimates by S. Newson and L. Marion, unpubl.). These estimates of total numbers are somewhat uncertain because of the incomplete coverage of coastal colonies in UK, Ireland and along the Kola Peninsula in Russia. Confining the comparison to only those breeding areas for which there was a high level of coverage in both 2006 and 2012 gave a change in breeding numbers from 38,470 pairs in 2006 to 29,638 pairs in 2012.

Overall, the available data suggest that the total breeding population of the Atlantic sub-species was relatively stable in the Western Palearctic and that it increased in some periods between 1980 and 2005 after which overall numbers have declined.



A Great Cormorant nest with two newly hatched chicks, Holløse Bredning, Denmark, 2006. Photo: Steffen Ortmann.

The earlier observed increase and current overall decline masks large geographical variations in population trends. In Iceland numbers first declined from 3,500 in 1975 to 2,350 in 1995 (Gardarsson 2008), then increased to approximately 4,100 nests in 2001 and 5,250 nests in 2010 (Gardarsson 2008). In Norway numbers increased from 21,000 pairs in 1983-1986 (Røv & Strann 1987) to 27,000 nests in 1995 (Røv 1997), then declined to 25,000 nests in 2000 (Røv et al. 2003). By 2005 the Norwegian breeding population was estimated at 30,000 pairs (Barrett et al. 2006), but many colonies in Norway decreased thereafter (some began doing so from 2002) and by 2012 breeding numbers had dropped to 19,000 pairs. The reasons for the general decline in Norway are not known, but it is presumed that declining food availability is one of the factors that have affected the development of the breeding population (S.-H. Lorentsen pers. comm.).

Breeding numbers in coastal colonies in the UK were apparently relatively stable during 1986-2005, with annual estimates ranging from ca. 8,000 to 9,500 breeding pairs (S.E. Newson unpubl.). The calculated trends suggest that this period was followed (2006-2012) by a period of decline in breeding numbers (S.E. Newson unpubl. data).

Along the coast of France, nest numbers were estimated at ca. 1,600 in 1988 (Debout et al. 1995), at 2,122 in 2003, and coastal breeding numbers have been stable since then (Marion 2008).

The increasing tendency for the *carbo* and *sinensis* sub-species to breed in the same colonies makes it increasingly difficult to reveal how numbers of the two sub-species are developing in France and in inland areas in the UK (see also Carss & Ekins 2002).

Population development of P. c. sinensis

The European breeding population of the continental sub-species of the Great Cormorant *P. c. sinensis* was small during long periods between the mid-1800s and the early 1970s (e.g. Hansen 1984, Lindell et al. 1995, Bregnballe 1996). By the early 1960s, total breeding numbers in the main breeding areas were estimated at 3,500-4,300 pairs (the main breeding areas were at that time The Netherlands, Germany, Denmark, Sweden and Poland; Bregnballe 1996).

Partly due to a gradual increase in the protection of the species, numbers began to increase during the 1970s-1980s. In the five countries mentioned above, population growth rates were on average 11 % per year during the 1970s and 18 % per year during the 1980s, and by 1995 breeding numbers had reached 95,000 pairs in these countries (van Eerden & Gregersen 1995, Bregnballe 1996). This rapid population growth was apparently the result of both increased survival and improved breeding success due to the combined effects of protection of breeding colonies, protection against shooting, a decrease in the use of pesticides, and high abundance of small fish in a large number of European waterbodies (van Eerden et al. 1995).

Breeding numbers stabilized in some of the core breeding areas in the early 1990s (Bregnballe et al. 2003), and declines have been recorded in recent years in several of the breeding areas that formerly housed many thousands of Great Cormorants (e.g. in main breeding areas in the west Baltic Sea; Herrmann et al. 2011). On the other hand, as the *sinensis* breeding population began to stabilize in the core breeding areas, it continued to extend its range into central and southern Europe and along the east Baltic Sea coast

the 1990s and the 2000s (Marion 1997, Marion & Suter 1997, Palomino & Molina 2009, Bregnballe et al. 2011, Hermann et al. 2011), thereby returning to breeding areas from where it had been extinct for a century or more (e.g. Hansen 1984, Lindell et al. 1995).

Increases in breeding numbers were also recorded in many breeding areas along the northern coast of the Black Sea and the Sea of Azov during the first 20-25 years after the early 1980s.

For the years 2000-2002, BirdLife International (2004) estimated total breeding numbers of *sinensis* to be 169,000 pairs in the countries that largely correspond to Area I, II, III and Romania and Bulgaria in Area IV of the present study. Using the same countries as BirdLife International, the comparable figure for the 2006 status was 219,400 pairs (Bregnballe et al. 2011) and for 2012 the comparable number was 225,800 pairs (excluding England inland, FYRO Macedonia and Baltic regions in Russia, but including *sinensis* in South Norway). Overall, this represents an increase of ca. 50,000 breeding pairs (30 %) between the years 2000-2002 and 2006 and an increase of ca. 6,000 breeding pairs (3 %) from 2006 to 2012.

Population development of P. c. sinensis after 2006

Several major changes have taken place in breeding numbers of the continental sub-species in the Western Palearctic from 2006 to 2012. They can be summarized as follows:

Increases in the eastern Baltic Sea. The breeding population along the eastern and south-eastern coast of the Baltic Sea increased by 17,000 breeding pairs from 2006 to 2012. This growth presumably reflected that this part of the Baltic Sea offered suitable breeding sites near to previously unexploited feeding areas where the densities of fish were sufficiently high to support the food demands of several very large colonies. Although there were new colonisations annually in this region, the growth levelled off in Finland and Estonia in the years up to 2012. Nevertheless, these countries were still the most important breeding areas in the eastern part of the Baltic Sea by 2012.

Decreases in the western Baltic Sea. Another major change in the Baltic Sea is the decrease of 15,000 breeding pairs in the western part of the region (Denmark, Sweden and Germany). This part of the Baltic Sea constituted a core breeding area for Great Cormorants in Europe for more than 20 years up to 2006. The food resource has presumably deteriorated around some of the former large colonies and, despite gradual changes in distribution, resulted in a more even distribution among breeding sites, whilst overall numbers have declined. Factors other than declining food availability in some of the important breeding areas are presumed to have contributed to the decline. These other factors, likely to have been of importance, include lower fledging success due to management actions in breeding colonies, increased mortality among first year birds and maybe older birds due to extensive shooting in the wintering areas in France, and a series of severe winters (Bregnballe 2009).

The North-East Atlantic. The most noticeable change recorded in the countries along the North-East Atlantic coasts was the increase of 4,500 pairs in Spain, France (inland areas) and Norway (Skagerrak). All of these countries have extensive areas of wetlands and many of these were only beginning to be colonised or had no breeding colonies in 2006. Based on the wetlands still unoccupied by breeding Great Cormorants, there is still potential for further

growth in breeding numbers in Spain, France and Norway. However, the rate of expansion in France and Norway is apparently to some extent hampered by human actions in breeding colonies, whereas this does not seem to have been the case in Spain.

Central Europe and Mediterranean. Many areas in central Europe and in the central and eastern Mediterranean did not have breeding colonies of Great Cormorants over many decades or for more than a century. Some of these areas were re-colonised during or after the 1990s and overall numbers increased by 3,900 pairs between 2006 and 2012. The largest increases were recorded in Greece, Serbia, Italy and Switzerland. The re-colonisation in some of the countries in this area may be hampered by human actions in breeding colonies aimed at avoiding establishment of new colonies.

Black Sea and Sea of Azov. For the Black Sea countries, our knowledge of trends since 2006 is incomplete. Counts were comparable for the Danube Delta, which in 2006 had 21,700 breeding pairs but by 2012 nest numbers had dropped by 50 %. Marked declines have also been recorded in some of the Black Sea colonies in Ukraine, but the exact extent of declines is currently uncertain (V. Kostiushyn pers. comm.). The coverage of the Krasnodar and Rostov regions on the Russian side of the Sea of Azov was good in both 2006 and 2012, and numbers here increased from 22,000 pairs in 2006 to 25,800 pairs in 2012 (an increase by 18 %). From the information available for the other regions between the Sea of Azov and the Caspian Sea it is somewhat unclear to what extent breeding numbers have increased since 2006.

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2 The former breeding population of Great Cormorants in Albania in 2012

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National summary

In 2012 no breeding pairs of Great Cormorants (*Phalacrorcorax carbo sinensis*) were reported in Albania. Great Cormorants were present as breeders in Albania from the 1950s (possibly before) until the early 1990s at two main areas. Breeding occurred at Kune in the north-west and at the Great Prespa Lake in the south east. A number of changes both in the natural environmental and the political structure have contributed to the decline in Great Cormorant breeding numbers in Albania over the last 40 years.

Historical development

Two locations have been described in the literature as the main historical breeding sites: the Kune area on the north-western coast and the Island of Maligrad located at the Great Prespa Lake in the south east.



Great Cormorants use to breed in Albania with up to 400-500 pairs in the early 1950s, but no breeding has occurred since the mid-1990s. Photo: F. Lamani. The former Kune breeding area covers a 3 km² area of wetland and is located in the north-western part of Albania, near the Adriatic Sea. Approximately one third of the area is covered by a large lagoon with fresh water marshland known as the Straw Marsh. Between 1951 and 1953 Great Cormorants and Pygmy Cormorants (*Phalacrocorax pygmeus*) were numerous in the area representing 30 % of the thousands of birds nesting in the Kune colony (*P. c. carbo* estimated at 400-500 pairs). Within 10-15 years a pronounced decrease in the *Phalacrocoracidae* family was noticed with ca. 150-200 Great Cormorant pairs from 1960-1964. This decline continued with 80-100 pairs estimated in 1966, 30-50 pairs in 1981, 15-20 pairs in 1984 and 5-8 pairs in 1991. By the mid-1990s Great Cormorants ceased to breed at this site. In 2012 there were no records of Great Cormorant breeding in this area.

The Great Prespa Lake (Korce) is the deepest lake in the Balkans with a tectonic depth of 853 m and is located 900 m above sea level. The small, rocky and uninhabited island of Maligrad, where cormorants have been breeding, is located in the middle of the lake. For a long time Great Cormorants used this location as a nesting site, because the island was not accessible to humans due to the specific geographic situation and existing border lines. As a result of political changes in the early 1990s, access to the lake area was no longer restricted and the lake is now regularly used by visitors, hunters and fishermen. Over time the Great Cormorant has disappeared as a breeding species on the island. On the cliffs on the left hand side of the main entrance to the caves the remains of a long abandoned Great Cormorant colony with 29 nests has been reported. In 2012 no Great Cormorants were breeding in this area.

Human interferences in colonies and other factors

In the 1960s the Ministry for Agriculture in Albania regarded the Great Cormorant as one of the species harmful to fish and it was stated they must be destroyed by all means. In the early 1960s Great Cormorant breeding numbers declined (especially in the Kune area) due to the destruction of eggs, the killing of juvenile birds at the nests and the destruction of nesting sites (cutting shrubs etc.).

Since the 1970s the natural environment in Albania has undergone severe changes that have affected numerous coastal and wetland areas and the associated waterbird communities. These changes in the natural environment have reduced possible foraging areas and the available nesting sites for the Great Cormorant. Up until the 1990s a number of wildlife reserves (including the Kune-Vain Reserve) were located within military zones and access was restricted. As a result of political changes in Albania in the early 1990s all military areas were dissolved and many wildlife reserves came to an end.

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3 Status of the breeding population of Great Cormorants in Austria in 2012

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National summary

In the summer of 2012, Austria had 65 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in a total of three colonies. For the second year in a row this shows a decrease in the number of breeding pairs compared to 2011 (85 pairs) and 2010 (170-180 pairs). Complete coverage of all known breeders was obtained in the 2012 count.

Distribution

The Great Cormorant disappeared as a breeding species in Austria due to a variety of factors including strong human persecution. In the years 2001 and 2003 respectively the Great Cormorant started to breed successfully again in two locations in Austria. In 2012 a third location was detected as a new breeding site. One of the three colonies with breeding Great Cormorants in 2012 is located close to the national borders towards Germany and Switzer-land in the west of the country and the two other colonies are located at the borders towards Slovakia and Hungary in the east of the country (Fig. 3.1).

The majority of Great Cormorants were breeding in Droesing, in the northeastern part of the state Lower Austria. Here Great Cormorants nested within a Grey Heron (*Ardea cinerea*) colony in floodplain forests along the river March. This river forms the border between Austria and Slovakia. In the most western corner of Austria a small group of breeders were nesting on an island in the Fussacher Bucht at Lake Constance (state Vorarlberg). A third colony was located close to the Hungarian border in the east at Neusiedler See (Lake Neusiedl, state Burgenland).



Figure 3.1. Distribution and size of breeding colonies of Great Cormorants in Austria in 2012. Source: Nemeth & Dvorak (2012), Niederer (2012), Zuna-Kratky & Pöhacker (2012).

All three colonies are located within nature protected areas, designated either as a National Park area or Special Protected Areas (SPAs). Almost all breeding Great Cormorants in Austria nest in trees. Only the small number of breeding pairs at Lake Neusiedl build their nests on the ground in reed beds close to Spoonbills (*Platalea leucorodia*) and Great White Egrets (*Casmerodius albus*).

Colony size

The three Great Cormorant breeding colonies in Austria contain 5, 11 and 49 occupied nests. The largest colony in Droesing, with 49 nests in 2012, was founded in 2003 when birds moved from a former colony in the floodplain area on the Slovakian side of the border to Austrian territory. After the colony was established, numbers fluctuated at around 50-60 nests between 2006 and 2009 and the colony reached a peak with 121 nests in 2010. During the following two years there was a strong decline in nests counted. The spring of 2012 was noticeably dry without the usual flooding of the surrounding wetlands. This may have had also negative effects on the food availability of the Great Cormorants, and may have contributed to the decline in colony size (Zuna-Kratky & Pöhacker 2012).

Great Cormorant and Eurasian Spoonbill breeding in a mixed colony at Lake Neusiedl, Austria, May 2012. Photo: Nemeth Erwin.



The second colony, with only 11 nests in 2012, is located in the Fussacher Bucht at Lake Constance (Niederer 2012). This colony was founded in 2001 and was the first record of a Great Cormorant colony in Austria after extinction. The colony had 20 nests in 2002. Numbers increased to 60-80 nests between 2003 and 2005 and reached 130-200 nests in 2008.

A third colony with about five nests was discovered at Neusiedler See in 2012. Here Great Cormorants are breeding within a mixed waterbird colony (see photo) on a large island covered with reed beds in the core area of the National Park (Nemeth & Dvorak 2012).

Human intervention in colonies

Actions which target the breeding Great Cormorants take place in one area, at the Fussacher Bucht, where conflicts with fisheries are intense. Almost since the establishment of the colony at the Fussacher Bucht at Lake Constance, conflicts with commercial fisheries have been an issue. Since 2004 fishermen have carried out various management actions to reduce the size of the breeding colony. Bird protection organisations have raised objections against these activities.

The main aim of these harassment actions is to reduce the number of Great Cormorant breeding pairs to an upper limit of about 30-60 pairs. Actions include tree felling and shooting Great Cormorants during the mating and breeding season to reduce the number of breeding pairs and to prevent the foundation of new nest sites along the lakeshore on Austrian territory. As a consequence of the severe interventions the number of breeding pairs in the Fussacher Bucht colony dropped from about 200 pairs in 2008 to zero in 2011 when the Great Cormorants abandoned the colony. In the following year (2012) a small group of 11 successful breeders built nests in trees in a different place on the same islet. No disturbance or management is taking place in the other two breeding colonies in Austria.

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4 Status of the breeding population of Great Cormorants in Belarus in 2012

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National summary

In 2012 the breeding population of Great Cormorants (*Phalacrocorax carbo sinensis*) in Belarus was estimated at 3,250 breeding pairs. This is an increase of ca. 20 % compared to 2005. Current estimates are based on almost full coverage in the 2012 count, where the majority of breeders were surveyed in known breeding areas. During the census 2,314 breeding pairs (1,849-2,914) were recorded in 20 colonies. Of these 20 colonies 14 were counted in the breeding season in 2012 and information about another five colonies was obtained from local people or during field investigations that took place after the end of the breeding season. For the long-living colony in the Chernobyl zone, we used data on breeding numbers collected in 2011. It was not possible to obtain complete coverage in 2012 as breeding took place in areas which were difficult to investigate and as well as within the Chernobyl zone.



This Great Cormorant colony, located on an islet in a pond at the Krasnaya Sloboda fish farm, was destroyed 1-2 years before 2012, June 2009. Photo: Irina Samusenko.

Distribution

Great Cormorants are widely distributed across Belarus with breeding taking place in five out of the six provinces (Fig. 4.1). Over one third (37 %) of the population was breeding in the south-eastern province of Homel (865 nests in four colonies). Both the central Minsk and the northern Vitebsk province had approximately one quarter (25 %) of breeders (Minsk 574 nests in four colonies; Vitebsk 580 nests in four colonies). The remaining breeders were found in the south-western Brest province (290 nests in four colonies) and the western province of Hrodna (5 nests in 1 colony) (Fig. 4.2).

Great Cormorants in Belarus bred exclusively in trees and shrubs, with more than half of all nests located above 5 m. The majority of Great Cormorants bred on lakes and reservoirs (51 %) and river floodplains (47 %). A total of nine colonies (1,004 breeding pairs) were located on lakes with an area of more than 100 ha, while three colonies (180 nests) were located on smaller lakes. Great Cormorants nested in floodplains in three areas (750 nests in two colonies at Dnieper, 315 nests in three colonies at Pripyat, and 5 nests in one colony at Neman). A small percentage of breeders was found breeding at a fish farm (15 nests) and on a flooded bog after peat extraction (45 nests).



Figure 4.1. Distribution and size of breeding colonies of Great Cormorants in Belarus in 2012.

Figure 4.2. Regional distribution of the breeding population of Great Cormorants in Belarus in 2012.



Colony size

In 2012, the Great Cormorant population in Belarus bred in 20 colonies. The largest colony contained over a quarter of the population (26 %, 600 nests) and was located in Dnieper river floodplain near the mouth of the river Sozh in the south-eastern province of Homel. Of the remaining 19 colonies, six colonies contained between 101 and 300 nests, four contained 51-100 nests and there were nine small colonies with less than 50 nests (Fig. 4.3). More than half of the breeding population (51 %) was found in colonies with between 101 and 300 nests (Fig. 4.4).





Figure 4.3 Size distribution of Great Cormorant colonies in Belarus in 2012.

Figure 4.4. Distribution of the Great Cormorant breeding population in relation to colony size in Belarus in 2012.

Human actions in colonies and other factors

Great Cormorants are considered game birds in Belarus and they are included in the list of so-called 'undesirable animal species' in the current edition of the Law on hunting management and hunting. Therefore regulation of Great Cormorant numbers is carried out according to hunting legislation. Hunters are allowed to eliminate such undesirable animals without special permission if they appear at their hunting grounds in the open season, and they can use any legal means of hunting allowed at that time of the year. During periods of the year when no hunting is allowed, a special license for specific hunting undesirable animals can be obtained.

At fish farms, special Great Cormorant elimination programs are implemented where the Ministry of Nature Resources and Environmental Protection permits shooting of Great Cormorants throughout the year. Fish farm administrations pay a reward for each Great Cormorant eliminated, and this increases the chances of keeping reliable records of the extent of culling. However, the only information about culling collected is the culling at fish farms. In 2011 a total of 9,833 birds were shot at 12 fish farms.

Great Cormorant management was carried out in 2012 in areas where conflicts with fisheries were intense: on fish ponds, areas with commercial fishing or in the vicinity. The main aims of the management are to reduce Great Cormorant numbers in total, to reduce juvenile production and to avoid successful establishment of new colonies. Human disturbance affects almost all the colonies, but in varying degrees. Evaluating the impact of management actions is not possible as permission to carry out these measures is not required, except when hunters claim reward from fish farms. In general the majority of management actions are not officially registered or publicized. According to our estimates (taking into account the dynamics of known breeding colonies) there has been a significant increase in Great Cormorant culling initiated by fish farms administrations, and the impact has increased in comparison with previous years.

In 2012 management was carried out in 11 colonies. This included four colonies in the Vitebsk region, three colonies in the Minsk region and two colonies in both the Brest and Homel regions. Shooting of adult Great Cormorants took place in nine colonies in 2012. In four such colonies there was very intense shooting in spring during the first half or the breeding period. In another five colonies Great Cormorants were shot periodically, and much less intensively. In four colonies in the Vitebsk region mainly Great Cormorant nests were destroyed. In one colony in the Brest region, eggs were removed from nests, while in two colonies in the Brest and Vitebsk region, nestlings were killed. In more than half of all known colonies breeders were scared away from their nests by fishermen, hunters etc.

Illegal actions took place in at least one colony in 2012. At Lukoml Lake in the northern province of Vitebsk several dozen juvenile Great Cormorants had the upper mandible removed. As a result the juveniles were unable to feed and most of them were caught and culled by the local nature conservation inspectorate or slowly died of starvation. This illegal action was investigated by the Ministry of Environment and other governmental authorities. The person responsible for the mistreatment of Great Cormorants has been fined under the law.

Starting from 2012, amendments to the current Law on hunting management and hunting are being discussed. It is expected, that the term "undesirable animal species" will be excluded from the law, and regulation of Great Cormorants will be implemented in two ways. Firstly on the territory of the fish farms according to the old practice and secondly using common approaches to regulate species, as allowed by the Law on protection of wild animals, when special permission for a specific number of animals is issued by Ministry of Environment to individual game managers based on scientific justification and their request.

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The author counting nests in the oldest Great Cormorant colony in Belarus, Lan River Mouth, Pripyat River floodplain, July 2008. Photo: Oleg Pareiko.

5 Status of the breeding population of Great Cormorants in Belgium in 2012

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National summary

In 2012, Belgium had 1,584 breeding pairs of Great Cormorants (*Phalacrorco-rax carbo sinensis*) in a total of 28 colonies. Count coverage is considered complete. The breeding population re-established itself in 1992 and a rapid increase in breeding numbers was seen between 1992 and 2005 (Devos 2011, Jenard et al. 2010). Since 2006 breeding numbers have been stable.

Distribution

Colonies are mostly found in the low-lying northern and western parts of the country (Fig. 5.1). Almost three quarters of all breeding pairs were located in five provinces in the Flemish region (1,146 breeding pairs, 72 %) (Fig. 5.2), with the remainder found in three provinces in the Wallonia region (438 breeding pairs, 28 %). Almost all pairs were found breeding in trees. A few pairs were using a cliff in an old quarry.

Colony size

There were 28 breeding colonies in Belgium in 2012. The largest colony had 213 nests and was located in the Hensies marshes, the only Ramsar site in Wallonia. Only three colonies contained more than 150 nests in 2012 (Fig. 5.3) and these three colonies contained ca. one third of the population (Fig. 5.4). Over half of all colonies had less than 50 nests and contained only 21 % of the national population.


Figure 5.1. Distribution and size of breeding colonies of Great Cormorants in Belgium in 2012.







Figure 5.3. Size distribution of Great Cormorant colonies in Belgium in Belgium in 2012.

Figure 5.4 Distribution of the Great Cormorant breeding population in relation to colony size in Belgium in 2012.



A few pairs of Great Cormorant breeding on a cliff created by extracting activities in a stone quarry in western Belgium. Only *P. c. sinensis* is known to breed in Belgium. This colony could be one of the rare examples of cliff-breeding for this sub-species. However, it is also possible that a small number of *P. c. carbo* are now breeding in inland colonies, as observed in north-western France. Photo: Marcel Moncousin.

Human intervention in colonies

No management actions are currently carried out in colonies in Belgium. Most colonies are located in areas with a protected status or in private areas (e.g. quarry). In 2012, one small colony was heavily disturbed after legal shooting of adult Great Cormorants occurred on the nearby river (breeding success was close to 0 in this particular colony).

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6 Status of the breeding population of Great Cormorants in Bosnia and Herzegovina in 2013

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National summary

In 2013 Bosnia and Herzegovina had 171 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in one colony. The colony was located at Prokosovići on Modrac Lake in north-western Bosnia. In 2011 this colony had 120-150 nests and another colony with 4 nests was recorded in the south west of Bosnia and Herzegovina in 2011 (Sjeničić & Kotrošan 2013).

Records of breeding colonies 1976-2013

In 1976 the first breeding Great Cormorants were reported in Bosnia and Herzegovina at Dugopolje fish farm at Bardača Lake located in the north of the country, close to the Croatian border (Kotrošan et al. 2012). The colony contained nine nests but five of these were destroyed by man, and in 1977 no breeding took place at this site. The next record of breeding Great Cormorants was in 1983 when a colony with 2 nests was found at Hutovo Blato, a nature reserve in the south west of the country (Kotrošan et al. 2012). By the end of the 20th century, these two colonies had disappeared and the Great Cormorant was again declared a nationally extinct species.

Since 2005 Great Cormorants have been surveyed as a part of regular ornithological monitoring in Bosnia and Herzegovina. In 2008 Great Cormorants began breeding again at Hutovo Blato, with 5 nests (Kotrošan et al. 2011). However the breeders were scared away and breeding ceased at this location. In 2010 a breeding colony with 80 nests was reported at Lake Modrac in the north east of the country and numbers in this colony had increased to 120-150 nests (108 nests counted) in 2011. In this year, a second colony with 4 nests was reported at Livanjsko Polje in the south west of the country.



Figure 6.1. Location of the breeding colony of Great Cormorants in Bosnia and Herzegovina in 2013.

In the literature there are reports of attempted unsuccessful breeding at additional sites and reports of breeding which have not been confirmed. At Prokosovići near Lake Modrac there are unconfirmed reports of Great Cormorants breeding in a mixed colony in 2003. At Lake Buško in the south west four pairs were reported to be breeding between 2009 and 2011 but it is not known whether these attempts were successful (Kotrošan et al. 2012).

In 2013 breeding took place at one location in Bosnia and Herzegovina (Fig. 6.1). The breeding colony was located in north-western Bosnia at Prokosovići on Modrac Lake and had 171 occupied nests. The nests were located in the tree tops in a Grey Heron (*Ardea cinerea*) colony. Within the mixed colony 114 trees were used (70 by Great Cormorants, and 44 by Grey Heron) with a total of 123 Grey Heron nests in the colony. The number of Great Cormorants breeding at this location was 120-150 breeding pairs (108 counted) in 2011 and 80 breeding pairs in 2010. Information available suggests that the colony was established in 2003.

Human intervention in colonies and other factors

In the period 2002-2009 Great Cormorants were protected from shooting by hunting laws adopted in Bosnia and Herzegovina. Legal protection of Great Cormorants prohibits deliberate killing. Despite this, Great Cormorants are killed across the country, especially in fish pond areas, but as far as we know, no actions took place in the breeding colonies in 2013. However, human interference in Great Cormorant colonies has been recorded in earlier years in areas where commercial or sport fishing is popular. On Modrac Lake the breeding colony is located in an isolated place, away from traffic and places of interest to people. Therefore the direct influence of people is limited, but conflicts with fishermen and harassment using speedboats and other motor boats have been recorded.

The 2013 count revealed that a second colony, which was active in 2011, had been abandoned. The colony was located at Hutovo Blato in northern Herzegovina (Buško Lake), and was abandoned due to disturbance by tourists, bathers and local people. Culling of adult birds takes place in Bosnia and Herzegovina but there are no accurate records of numbers culled. We have records of cases of Great Cormorants being shot in Central Bosnia (Visoko), Northern Bosnia (Modriča, Čelinac), Western Bosnia (Šipovo) and North-East Bosnia (Tuzla). In most cases a single Great Cormorant was found shot. The only exception was in Visoko where four Great Cormorants were found shot.

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7 Status of the breeding population of Great Cormorants in Bulgaria in 2012

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National summary

In 2012, Bulgaria had an estimated 2,775 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 15 colonies. It is judged that almost complete coverage was achieved during the 2012 census. We counted 2,658-2,677 nests and our best estimate is that there were 2,700-2,850 breeding pairs in Bulgaria in 2012 (i.e. ca. 93-95 % were counted). The recent census showed an increase of ca. 700 breeding pairs (approx. 35 %) compared to the last complete national survey of breeding Great Cormorants in 2006 (Shurulinkov et al. 2007). The number of colonies also increased: From 10 in 2006 to 15 in 2012.

Most of the colonies along the Danube River were counted twice during the breeding season (at the end of April and the end of May) and variations were reported in the breeding numbers due to a large number of fallen trees, caused by storms following the first count. In this report we use the highest number of nests recorded in the individual colonies (in most colonies the highest number of nests were recorded during the first count in April).

Distribution

Great Cormorants bred in 15 colonies in 2012 (Fig. 7.1). The majority of breeders (89 %) were located in the northern (River Danube) and eastern (Black Sea coast) regions (Fig. 7.2). In the north Great Cormorants bred along the River Danube in six colonies containing 48 % of the national population (1,292 nests). In the east along the Black Sea coast a further three colonies contained 41 % of the population (1,088 nests). The remaining 11 % of breeders were located in four regions across the country.



Figure 7.1. Distribution and size of breeding colonies of Great Cormorant in Bulgaria in 2012.



Number of nests

We also recorded a few colonies on islets in the Romanian part of the Danube (these are not included in the maps and figures for Bulgaria). All Bulgarian colonies were situated on hybrid/black poplars or willow trees with the exception of the largest colony on the Black Sea coast, where more than half of all breeders used electric pylons.

Region	Colony Name	Nests
		NUSIS
Danube River	Kutovo Island	100
Danube River	Malak Bliznak Island	125-130
Danube River	Dolni Tsibar Island	700
Danube River	Mishka Island	260
Danube River	Malak Kosui	100
Danube River	Srebarna Lake	3-5
Arda River	Studen Kladenets Dam Lake	50-60
Arda River	Arda River	3-4
Pleven	Gorni Dabnik Dam Lake	165
Maritsa River	Zlato Pole	4-5
Maritsa River	Simeonovgrad	10
Plovdiv	Panicheri Dam Lake	50
Black Sea Coast	Bourgas (Vaya) Lake	3
Black Sea Coast	Mandra Dam Lake + Poda	910
Black Sea Coast	Durankulak Lake	175

Table 7.1. Details of the regional distribution and size of the Great Cormorant colonies in

 Bulgaria in 2012. Source: I. Nikolov, P. Shurulinkov & B. Borisov.

Colony size

A total of 15 Great Cormorant colonies were counted during the 2012 breeding season in Bulgaria (Table 7.1). The total number of colonies is estimated at 15-20. We believe that the unknown colonies (if any) have had only a low number of pairs because the probability of detection of colonies with more than 50 pairs is judged to be high. Colonies ranged from the smallest containing 3 nests to the largest containing 910 nests. The largest colony was located at Mandra Dam Lake and Poda along the Black Sea coast.

Two colonies had more than 700 nests in 2012 (Fig. 7.3). Almost two thirds (60 %) of the national breeding population was found in these two colonies (Fig. 7.4). In the remaining 13 colonies, six had fewer than 50 nests, but had only 3 % of all breeders (74 nests). The remaining seven colonies of intermediate size (51-700 nests) held 33 % of the breeding population.

Human intervention in colonies and other factors

Forestry management as well as river-bed management activities have been reported to cause a decrease or complete eradication of some colonies along the Danube. Although rarely, poaching also occurs in some recreational/commercial fishing areas (i.e. fish ponds) close to existing colonies. Intentional felling of trees, which Great Cormorants use to nest in, also happens in otherwise flooded areas, that remain dry in summer/autumn.





Figure 7.3. Size distribution of Great Cormorant colonies in Bulgaria in 2012.

Figure 7.4. Distribution of the Great Cormorant breeding population in relation to colony size in Bulgaria in 2012.

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A Great Cormorant in breeding plumage. Photo: Thomas Bregnballe.

8 Status of the breeding population of Great Cormorants in Croatia in 2012

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National summary

In the summer of 2012, Croatia had 1,331 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in two colonies. This is a decrease of over 800 breeding pairs compared to 2008 (2,156 breeding pairs). This is primarily a result of a decrease in breeding numbers in the main colony at Kopacki rit. This may be due to the degredation of suitable nesting trees as a result of continious breeding at this location over many years, and two subsequent dry seasons without appropriate flooding which may have affected the amount of fish available for the Great Cormorants.

Distribution and colony size

In 2012, the Great Cormorants bred in two colonies. The largest colony had 813 nests and was located in the Kopacki rit Special Zoological reserve situated in north-eastern Croatia (Fig. 8.1). This colony contained almost two thirds of the national breeding population (Fig. 8.2). Breeding at Kopacki rit was confirmed since late 19th century (Mojsisovics 1883; Schenk 1918; 1929). Regular annual censuses started in 1963. The lowest breeding numbers were reached during the 1960s and the mid 1970s with 23-133 nests per year and irregular breeding (Mikuska & Lakatos 1977). The population started to expand exponentially from 1977 reaching a peak in 1988 (Mikuska & Mikuska 1994). A decline in the number of nests occurred in 1990 when adults and chicks where intentionally killed by fishermen. During the last 14 years numbers have fluctuated (between ca. 1,000 and ca. 2,000 nests), but over the last six years a constant decline in breeding numbers has been observed, presumably due to deterioration of the nesting habitat.



Figure 8.1. Distribution and size of breeding colonies of Great Cormorants in Croatia in 2012.



The second colony contained 518 nests (39 % of the population) and was located at Lonjsko polje Nature Park (near Puska village) along the Sava river floodplain. Breeding has taken place at this colony since 2007. The breeding numbers in this colony fluctuated from 350 to 600 nests in the past six years. The breeding of Great Cormorants in the Lonjsko polje Nature park has been recorded since 1986 when two colonies were present (Schneider 1989). The first colony at Mokro polje held 124 and 181 nests during 1986 and 1987, respectively (Schneider 1989). The second at Lonjsko polje had 182 nests during 1987 (Schneider 1989). Since these two colonies do not exist nowadays, it is very likely that birds from these colonies have started to breed at a single site.

A third location, Sakadas Lake at the Kopacki rit Special Zoological reserve, was surveyed in 2012, but breeding did not occur at this site. This site, known for decades as one of the main wintering roosts for Great Cormorants in Croatia, occasionally serves as a breeding place for up to 15 pairs. It is located 2.5 km from the existing large colony.

Great Cormorants bred exclusively on softwood trees in Croatia, primarily White willows (*Salix alba*) and White and Black poplars (*Populus alba, P. nigra*).

Human intervention in colonies

No management actions are carried out to control breeding numbers of Great Cormorants in Croatia. The Croatian breeding population is listed in the Croatian Red Book as Vulnerable (Radović et al. 2003) and it is consequently strictly protected. This protection applies during the breeding season and within a 50 km radius from the existing colonies. Outside the breeding season Great Cormorants are protected on the rivers and in other wetlands and they should not be harassed or persecuted. However, as an exception, they are not protected on commercial fish ponds and fishermen can apply all appropriate methods (including shooting of adults) in order to protect their stock from predation.

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Great Cormorant colony at Lonjsko polje, spring 2012. Photo: Nenad Setina.

9 Status of the breeding population of Great Cormorants in the Czech Republic in 2013

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National summary

In 2013 there were 266 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in a total of six colonies in the Czech Republic. The breeding population decreased by 10 % from 2012 when there were 297 breeding pairs in seven colonies. The overall trend indicates that the national population has remained stable since 2005 with numbers fluctuating between 266 and 350 pairs. Complete coverage of all known colonies was obtained in the 2013 count and in all previous counts since the re-establishment of the breeding population in 1982.

Distribution

After an absence since 1962 Great Cormorants recolonized the Czech Republic in 1982 when a colony was discovered in South Moravia. In the following years the Czech Great Cormorant population expanded rapidly, with a mean annual increase of 45 % between 1982 and 1991. By 1991 it appeared that an upper limit had been reached of 682 pairs (Janda & Machacek 1990, Lindell et al. 1995, Musil & Janda 1997). By 1997 the breeding population had decreased to 153 pairs as a result of dead trees falling and regulatory measurements (esp. shooting in the pre- and post-breeding seasons). A gradual increase in the number of breeding pairs was recorded again after 1997 reaching 291 pairs in 2005. In total, 22 different breeding colonies were recorded in the Czech Republic between 1982 and 2013 (Martincova & Musil 2003, Musil & Musilova 2011).

In 2013 Great Cormorants were breeding in four regions across the Czech Republic with the majority of breeders located in the south of the country (Fig. 9.1). Almost half of the breeding population was found in one colony located at Trebon Basin in the region of Southern Bohemia (48 %, 129 nests) (Fig. 9.2). A further 37 % of the breeders (98 nests) were located in three colonies in the region of Southern Moravia. Great Cormorants were also breeding in small numbers in one colony in the floodplain area of the River Odra in Northern Moravia (11 %, 29 nests) and one colony in the Chomutov District in Northern Bohemia (4 %, 10 nests).



Figure 9.1. Distribution and size of breeding colonies of Great Cormorants in the Czech Republic in 2013.



The majority of Great Cormorants in the Czech Republic were found breeding close to fish ponds (86 %, 229 nests) with the remaining breeders located close to reservoirs or pools. All Great Cormorants breeding in the Czech Republic were nesting in trees.

Colony size

In 2013, the Great Cormorant population in the Czech Republic bred in six colonies. The largest colony had 129 nests and was located at Zenich fish pond in Trebon Basin in South Bohemia. This colony has shown a slight decline in breeding numbers since 2012 when it had 149 nests. The remaining five colonies contained less than 100 nests and ranged in size from 10 to 65 nests (Fig. 9.3). The majority of the population were breeding in the largest colony (48 %; Fig. 9.4). In 2012 breeding took place in seven colonies across the country. The count in 2013 revealed that no breeding took place at a previously active colony at a sedimentary reservoir near Chomutov in Northern Bohemia.





Figure 9.3. Size distribution of Great Cormorant colonies in the Czech Republic in 2013.



Human intervention in colonies and other factors

In 2013 five out of six colonies were located in or close to carp fisheries. Daily sailings took place in order to disturb Great Cormorants attempting to establish new colonies. Nevertheless, no direct persecution has been reported to exist in colonies since 2003.

However, shooting is usually allowed in breeding areas outside the breeding season (which is defined to be from April to mid-July). Numbers of birds shot increased from 234 in 1988 up to 4,731 birds in 2011. Some fishery companies encourage shooting and killing of Great Cormorants by offering a payment of ca. 300 Czech crowns (equals ca. 12) for each bird killed (see also Martincova & Musil 2003).

The majority of Great Cormorants shot in the Czech Republic were shot in the regions of South Bohemia and South Moravia, with shooting efforts focused on an area 30 km from breeding colonies. Out of the total number of birds shot in the country, 65 % (according to hunting bags in 2004-2005) or 73 % (according to ringing recoveries) were shot in these regions. Furthermore 94 % of the Great Cormorants shot which had been previously ringed in breeding colonies in the Czech Republic, were found in breeding regions (i.e. up to 30 km from a breeding colony). Although the shooting of Great Cormorants primarily targets migratory birds, recovery data shows that it probably has an important effect on the breeding population in the areas where shooting takes place, and due to fidelity to the breeding area, also after the end of the breeding season.

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10 Status of the breeding population of Great Cormorants in Denmark in 2012

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National summary

There were 27,237 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in the summer of 2012 in Denmark. This is an increase of ca. 1,700 breeding pairs compared to 2011. The Great Cormorants had colonies or attempted to found colonies at 64 locations in 2012. This is close to the highest number of colonies recorded in Denmark to date. It is believed that complete coverage of all known breeders was obtained during the 2012 count.

Distribution and colony size

Colonies were found across the country, but the larger colonies were located in coastal areas or within 6 km of the coast (Fig. 10.1). The majority of Great Cormorants were breeding in south west Kattegat and in south east Denmark (Fig. 10.2). Together these two regions had almost half of the breeding population.

The breeding population in Denmark has gradually become more and more evenly dispersed over the last 30 years. Denmark had large colonies with up to 7,500 nests in earlier years, but the largest colony found in 2012 contained 2,640 nests. A total of six colonies had more than 1,000 nests in 2012 (Fig. 10.3). One third of the breeding population was found in these six colonies (Fig. 10.4). Most of the colonies (44 out of all 64 colonies) had less than 500 nests, and these colonies had 28 % of all breeders in Denmark. The 14 colonies of intermediate size (500-1,000 nests) held 39 % of the breeding population. Around 50 % of all the Great Cormorants breeding in Denmark were nesting on the ground on small islets in 2012.



Figure 10.1. Distribution and size of breeding colonies of Great Cormorants in Denmark, 2012.







Figure 10.3. Size distribution of Great Cormorant colonies in Denmark in 2012.

Figure 10.4. Distribution of the Great Cormorant breeding population in relation to colony size in Denmark in 2012.

Human intervention in colonies

In some of the areas where conflicts with fisheries are intense management of breeding colonies were carried out by the Ministry of Environment. Some of the management actions were aimed at avoiding successful establishment of new colonies. Other actions were aimed to further reduce the size of existing colonies by limiting the production of juveniles. The production of juveniles is limited by spraying eggs with vegetable oil whereby the embryo dies but the adults continue to incubate.

As in the previous two years a total of app. 3,000 nests were exposed to such management actions. Up to 7,000 nests have been exposed to management in earlier years. Oiling of eggs took place in seven colonies in 2012 affecting a total of 2,607 nests. Eggs were removed in two colonies (271 nests) and breeders were scared away from their nests in one colony (35 nests).

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The Great Cormorant colony at Mågeøerne near Bogense, April 2011. Photo: Thomas Bregnballe.

Malurtholm at Møn, June 2006. Photo: Kjeld T. Pedersen.



11 Status of the inland breeding population of Great Cormorants in England, Scotland, Wales and Northern Ireland in 2012

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National summary

In 2012 there were 2,809 breeding pairs of Great Cormorants breeding in 53 inland colonies in England, Scotland, Wales and Northern Ireland. The vast majority of these inland colonies (48 colonies with 2,362 nests) were located in England where the colonies were believed to consist of a mix of *P. c. sinensis* and *P. c. carbo*. Scotland had four inland colonies of *P. c. carbo* (389 nests) and Wales had one inland colony of *P. c. carbo* (58 nests); there is no record of inland breeding of *P. c. sinensis* in these two countries. No inland colonies are known to exist in Northern Ireland. It is estimated that complete coverage of all inland breeders in England was obtained during the 2012 count. The 2012 count in England included visits to all 94 inland sites where breeding had been attempted (successful or not in earlier years) or where recent breeding was suspected. There is some evidence that the breeding population of Great Cormorants in inland colonies in the UK is stabilizing with only a small increase in breeding numbers since 2005 (2,204 breeding pairs; Newson et al. 2013).

Distribution

Great Cormorants began breeding inland in the UK in England in 1981 at Abberton Reservoir in Essex, north east of London. Since establishment, the inland tree-nesting population has increased considerably and successful breeding has now occurred at 89 inland sites in England. The continental sub-species *P. c. sinensis* is known to have played the more important role in the initial colonization and subsequent development of the inland Great Cormorant breeding population. However the inland colonies in England today comprise both *P. c. sinensis* and nominate *P. c. carbo*.

An inland breeding site is defined as a site away from traditional coastal cliffs, stacks and offshore islands but a number of the breeding sites are close to es-

tuaries or open coasts. In the years after colonization, numerous new colonies were established inland. Between 1981 and 1988 Great Cormorants were reported breeding in small numbers at seven additional sites, primarily in the south-east of the country. From 1989 to 1995 a further nine colonies were established with the range expanding further to the north and the west. Between 1996 and 2003 the number of breeders expanded through rapid growth of existing colonies and the establishment of a further 16 new colonies.

The inland breeding population in England began to show signs of stabilization from 2004-2012 with numbers remaining relatively stable at around 2,300 pairs. This stabilization is a result of a combination of factors. In the older, larger colonies established in the late 1980s and early 1990s a decline in breeding numbers has been observed. However breeding numbers in colonies established between 1996 and 2003 have remained fairly stable or increased during this period, and successful breeding was reported from an additional 15 sites during this period.

By 2012 Great Cormorant colonies were located in 26 counties across eight out of the nine Government Office regions in England, with no breeding activity reported in the North East (Fig. 11.1). Almost two thirds of all breeders (65 %, 1,536 breeding pairs) were located in the regions East England and South East England (Fig. 11.2). Essex in the East of England region was the county with the highest number of breeders with 437 pairs and overall the East of England region contained most breeders with over 40 % of the national population (961 breeding pairs). All Great Cormorants breeding in inland colonies in England nested in trees in 2012.

Among Scotland, Wales and Northern Ireland a small number of exclusively *P. c. carbo* colonies were reported inland. One colony with 58 nests was reported in Wales in 2012 and four colonies comprising 389 breeding pairs were reported in Scotland in 2012. According to the information available there were no inland breeding colonies in Northern Ireland in 2012.



Great Cormorant colony at the Abberton reservoir, north east of London, 2009. The first inland colony in England was founded here in 1981. Photo: Jez Blackburn / BTO.



Figure 11.1. Distribution and size of inland colonies of Great Cormorants in the United Kingdom in 2012, including 48 inland colonies in England (all believed to be mixed colonies of *P. c. sinensis and P. c. carbo*), one inland colony of *P. c. carbo* in Wales and four inland colonies of *P. c. carbo* in Scotland; there was no known inland colonies in Northern Ireland in 2012. Source: BTO. The many colonies of *P. c. carbo* located along the coasts of England, Northern Ireland, Wales and Scotland are not displayed.



Colony size

In 2012, the Great Cormorant population in England bred in 48 inland colonies. The largest colony had 226 nests (10 % of the breeding population) and was located in Walthamstow Reservoirs in the Lea Valley in Essex. After this colony, five colonies held between 101 and 200 nests, containing almost one third of the breeding population (31 %) (Fig. 11.3, 11.4). A further one third of the population (35 %, 828 nests) was found in colonies with between 51 and 100 nests. Most of the colonies (32 out of 48 colonies) had fewer than 50 nests, and these colonies had 24 % (562 nests) of all breeders in inland colonies in England.





Figure 11.3. Size distribution of Great Cormorant colonies in England in 2012. Colonies in Scotland and Wales not included. Source: BTO.

Figure 11.4. Distribution of the Great Cormorant breeding population in relation to colony size in England in 2012. Colonies in Scotland and Wales not included. Source: BTO.

Sub-species composition

Using an observed relationship between colony age and percentage *P. c. sinensis* recorded at six inland colonies in the late 1990s (Newson et al. 2007), we estimate that by 2012, approximately 66 % of the inland breeding population in England is likely to show characters of *P. c. sinensis*. However, hybridisation between the two sub-species has been demonstrated at inland colonies in England through molecular studies (Goostrey et al. 1997, Winney et al. 2001). The level of hybridisation occurring and the influence of this on biometrics is unknown, but it is possible now that distinction between the two sub-species is blurring.

Human intervention in colonies and other factors

The increase in numbers of Great Cormorants breeding at inland sites in England has created intense conflicts between Great Cormorants and fisheries. Great Cormorants have been actively dissuaded from breeding in a number of areas during the population expansion since the 1980s. From 1996 onwards licenses have been made available to shoot Great Cormorants (outside the breeding season) to prevent serious damage to fisheries. Initially the number of licenses issued was small, and shooting was used as a means to aid scaring, rather than a means of population control. However in 2004 there was an increase in the number of birds that could be shot per year, with an upper limit of 3,000 individuals for a short period, and up to 2,000 birds annually thereafter.

Additionally, between 1996 and 2000, illegal shooting during the breeding season is believed to have taken place at a number of colonies in England, including at the large colonies of Besthorpe and Deeping St. James in 2000. Legal control has also been carried out at Haweswater in Cumbria from 1999 onwards to reduce the risk of predation of a threathened freshwater white-fish the Schelly (*Coreganua stigmaticus*).

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Great Cormorant colony at the Abberton reservoir, north east of London, 2009. Photo: Jez Blackburn / BTO.

12 Status of the breeding population of Great Cormorants in Estonia in 2012

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National summary

In 2012, Estonia had an estimated 13,000 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 18 colonies. A total of 12,880 nests were counted during the breeding season. This is a slight underestimate as storms prevented complete counts to take place on two dates. A total of 12,930 nests were recorded in 2011, so there was no change in breeding numbers from 2011 to 2012.

Distribution

All colonies except one were found in coastal areas of Estonia. One inland colony was located on Lake Peipsi (Fig. 12.1). The majority of Great Cormorants were breeding on islets of the Gulf of Riga and Gulf of Finland (Fig. 12.2). Together these regions had 73 % of the breeding population. The Moonsund Archipelago was home to 22 % of the breeding population. A large percentage (87 %) of Great Cormorants breeding in Estonia were nesting on the ground on small islets in 2012.

Colony size

In 2012, the Great Cormorants bred in 18 colonies in Estonia. This is 12 colonies less than in 2011. The largest colony had 2,057 nests and was located on Kerju islet in the Gulf of Riga. A total of five colonies had more than 1,000 nests in 2012 (Fig. 12.3) and 62 % of the breeding population was found in these five colonies (Fig. 12.4). Half of the colonies (nine out of all 18 colonies) had fewer than 500 nests, and these colonies had 15 % of all breeders in Estonia. The four colonies of intermediate size (501-1,000 nests) held 23 % of the breeding population.

In 2012, the breeders were in good condition with an average clutch size of 3.65 eggs (in 8,249 nests sampled). In previous years, following harsh winter conditions clutch sizes were 3.00 in 2010 (in 4,045 nests sampled) and 3.27 in 2011 (in 5,794 nests sampled).



Figure 12.1. Distribution and size of breeding colonies of Great Cormorants in Estonia, 2012. Source: Environmental Board, Estonia.







Figure 12.3. Size distribution of Great Cormorant colonies in Estonia in 2012. Source: Environmental Board, Estonia.

Figure 12.4. Distribution of the Great Cormorant breeding population in relation to colony size in Estonia in 2012. Source: Environmental Board, Estonia.

Human intervention in colonies and other factors

Management is carried out in areas where conflicts with fisheries are intense. The main aim of the management 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 ca. 2,000 nests. In many Great Cormorant colonies, especially in those at the Gulf of Riga, people have systematically destroyed Great Cormorant nests. This is the main reason for a particularly high mobility of colonies in this region.

There are increasing levels of predation pressure by White-tailed Eagles (*Haliaeetus albicilla*) in Great Cormorant colonies in Estonia. For example, on June 29th 2012, 43 eagles were present in two nearby (0.6 km apart) Great Cormorant colonies in Käina Bay (observation by Leho Aaslaid and Vello Tarning). In Estonia, the number of White-tailed Eagle breeding pairs is estimated at 220-250 and the total numbers (breeders and non-breeders together) at 900-1,250 individuals.

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White-tailed Eagles are common visitors in Great Cormorant colonies in Estonia. Tondirahu colony, June 2009. Photo: Arne Ader.

13 Status of the breeding population of Great Cormorants in Finland in 2012

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National summary

In 2012, there were 17,258 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in Finland. This is a decrease of ca. 500 breeding pairs (3 %) compared to 2011. However in 2012 there was an increase in the number of breeding colonies. Great Cormorants established colonies in 41 locations in 2012, including eight new sites. This is the second highest number of colonies recorded in Finland (50 in 2009) since breeding started in 1996. Overall the Finnish Great Cormorant population has been fluctuating between ca. 14,400 and 17,700 breeding pairs since 2009.

Distribution

As in previous years Great Cormorants bred exclusively in the coastal archipelagos and Great Cormorants have now colonized most Finnish sea areas, being practically absent only in Åland and in parts of northern sea areas (Fig. 13.1). In 2012, the majority of the breeding population (57 %) and colonies (65 %) were found in the southernmost sea areas (Fig. 13.2): From the Gulf of Finland (5,945 nests) to the Archipelago Sea (3,838 nests). The Bothnian Sea held over one third of the population (6,151 nests), concentrated in four larger colonies. A small percentage was breeding in the northernmost sea areas: from the Kvarken Area (1,096 nests) to the Bothnian Bay (178 nests).

The majority of Great Cormorants nest on rocky, almost treeless islets in the outer archipelagoes (Ryttäri 2011). In total, 60 small islets were inhabited by breeding Great Cormorants. The mean size of islets was 0.9 hectares (0.1-5.2 ha). Additionally one colony was breeding on a larger island (118 ha). This was the first time that Great Cormorants were breeding on a larger island in Finland. Also the first attempt to breed on an estuary islet was reported in 2012. The largest colonies (>1,000 nests) were located 0.7-4.6 km from the mainland. The majority of the breeding population, 74 % of Great Cormorant pairs and 60 % of colonies, were located in nature conservation areas.

Great Cormorants were nesting on the ground in the majority of colonies (63 %). In 18 % of the colonies Great Cormorants bred exclusively in trees and in 19 % of the colonies Great Cormorants nested both on the ground and in trees. In total, 82 % of all nests were located on the ground.



Figure 13.1. Distribution and size of breeding colonies of Great Cormorants in Finland in 2012.



The presence of an increasing number of White-tailed Eagles (*Haliaeetus al-bicilla*) and a more frequent occurrence of predation is probably the reason for the observed reduction in 2012 in the number of Great Cormorants breeding in the south-western sea areas (from the westernmost part of the

Gulf of Finland to the Archipelago Sea). In this region the number of breeding pairs declined by 12 % compared to 2011, while on the eastern part of the Gulf of Finland, where the White-tailed Eagle is still quite uncommon, the number of nests increased by 14 % compared to 2011. We have observed up to 18 White-tailed Eagles staying simultaneously inside one large colony in the Archipelago Sea during the nesting period of Great Cormorants in 2012. The number of Great Cormorant nests in that particular colony declined by 30 % in 2012 compared with 2011.

Colony size

Nearly half (47 %) of the Finnish population in 2012 was concentrated in the five largest colonies (>1,000 nests) (Fig. 13.3 and 13.4). The largest colony was located at Merikarvia in the Bothnian Sea and it had 2,371 nests, which is the largest colony ever reported in Finland. The six colonies of intermediate size (501-1,000 nests) contained 29 % of the breeding population and the remaining 30 smaller colonies (<500 nests) contained 24 %.





Figure 13.3. Size distribution of Great Cormorant colonies in Finland in 2012.

Figure 13.4. Distribution of the Great Cormorant breeding population in relation to colony size in Finland in 2012.

Human intervention in colonies

The illegal persecution of Great Cormorants has tapered off markedly during the 2000s. In 2012, six small colonies (167 nests) failed totally during breeding; at least two of them due to persecution. In 2010-2011, 4-5 % of all nests were destroyed illegally, while the proportion was much higher (11-17%) in 2008-2009.

Legal population management actions have taken place in Finland for only two years in a restricted area. In 2012, the Southwest Finland Centre for Economic Development, Transport and the Environment (ELY Centre) gave a special license to control breeding Great Cormorants in one small fishing area of pikeperch in the inner part of the Archipelago Sea. The license limited the management actions to scaring Great Cormorants away from the colonies before egg-laying. This took place in three small colonies and was unsuccessful in one case. In 2010, a similar license was issued, applying to four small colonies in the same area; additionally egg-pricking was carried out in one of the colonies which contained 325 nests. However an investigation into the diet of Great Cormorants in the south coast of Finland showed that Great Cormorants had no impact on the local populations of perch and roach, which were the main food of Great Cormorants (Lehikoinen et al. 2011).

The ELY Centre also gave special licenses to shoot Great Cormorants in a few fishing areas in south-western Finland during the autumn hunting seasons in 2010-2012. In the 2010-2011 seasons, licenses were issued to shoot 930 Great Cormorants in total, although only 204 Great Cormorants were shot. In 2012 licenses were issued for only 60 Great Cormorants, but none were shot. From hunting samples obtained during 2010-2011 it was found that ca. 60 % of birds shot were of the nominate sub-species (*P. c. carbo*), apparently originating from northern Norway (Rusanen et al. 2012).



Monitoring brood sizes in the Great Cormorant colony at Östergadden Islet, the Gulf of Finland, early June 2012. Photo: Heikki Kotiranta.

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A typical ground- and tree-nesting colony of Great Cormorants in the outer archipelago in the Gulf of Finland. Östergadden, mid-June 2006. Photo: Terhi Ryttari.

14 Status of the breeding population of Great Cormorants in France in 2012

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National summary

It was estimated there were ca. 8,673 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 135 colonies in 2012 in France (range 8,624 - 8,722). The total breeding numbers included 2,042-2,046 nests in 27 coastal colonies (presumed mainly *P. c. carbo and P. c. norvegicus*) and 6,581-6,676 nests in 108 inland colonies (mainly *P. c. sinensis*, however with a significant proportion of *P. c. carbo* in western France). This is an increase of ca. 1,400 breeding pairs compared to the last national census in 2009, essentially due to an increase in the number of inland colonies (totalling 107 colonies compared to 78-81 in 2009). The number of breeding pairs in the coastal colonies have remained stable (+58 breeding pairs), and so has the number of colonies (27 compared to 28 in 2009). The majority of breeding colonies were surveyed during the 2012 count, except for nine colonies (7 %) where breeding numbers from previous years were used.

Distribution

Most of the colonies were found in the northern part of the country, particularly in Normandy (1,985 nests), in Pays-de-la-Loire (1,947 nests, including 1,603 in the department of Loire Atlantique, the most important area for the species in France), in Nord & Picardy (1,440 nests) and in Brittany (1,027 nests) (Fig. 14.1, 14.2). The remaining 26 % of the French breeding population of Great Cormorant was distributed across the country in 62 small colonies. The breeding population in France has gradually become more and more evenly dispersed since the pioneering colony of Lac de Grand-Lieu was established in 1981.



Figure 14.1. Distribution and size of breeding colonies of Great Cormorants in France in 2012.



Number of nests

Colony Size

In 2012 Great Cormorants bred in 135 colonies in France, with the five largest colonies located in Loire Atlantique, Manche, Eure and Somme. The largest colony was located at Lac de Grand-Lieu, a lake located to the south-west of Nantes and held 8 % of the national population (739 nests). The remaining four large colonies contained between 403 and 476 nests and were located in Manche, Eure and Somme. These five colonies contained 29 % of the breeding population in France, while all the other colonies were markedly smaller. The majority of colonies (82 %, 111 out of 135) contained less than 100 nests (Fig. 14.3) but they had only 36 % (3,163 nests) of the national total breeding population (Fig. 14.4). A further 16 colonies contained between 101 and 250 nests and held just over one quarter of the population. Almost all Great Cormorants in coastal colonies were nesting on the ground on small islets or on cliffs in 2012. Great Cormorants breeding in inland colonies were nesting in trees, mainly close to ponds or lakes but also along rivers.





Figure 14.3. Size distribution of Great Cormorant colonies in France in 2012.

Figure 14.4. Distribution of the Great Cormorant breeding population in relation to colony size in France in 2012.

Human intervention in colonies and other factors

In order to avoid settlement of breeding populations in certain inland areas where conflicts with fisheries may have emerged (fish pond areas), management of breeding colonies was carried out by the Ministry of Ecology in 2012. The management included destruction of all the nests in two colonies (totalling 29 nests) and partial destruction in two additional colonies (totalling 60 nests). Initially such preventive management actions were carried out only in the more important fish pond areas in France, particularly in Brenne (Indre), Sologne (Loir & Cher), Dombes (Ain), and Lorraine, but the areas have been extended recently (now also including Jura). Management actions are not allowed in mixed colonies (where herons are also breeding) and in colonies containing the marine Great Cormorant sub-species, which have colonized several inland colonies in recent years (Marion 1995, Marion & Le Gentil 2006).

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Marine coastal colony at île de Sein, France, 2012. Photo: Mickael Buanic.

15 Status of the breeding population of Great Cormorants in Germany in 2012

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National summary

In 2012, Germany had 22,550 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 150 colonies. From three small colonies only preliminary numbers were available at the time of reporting in February 2013. It is judged that all breeding sites in Germany were covered during the 2012 count. After a period with strong increase, the number of breeding pairs in Germany reached a peak with 25,100 pairs in 2008. In the following years numbers decreased to less than 19,500 pairs in 2011 but increased again in 2012.

Distribution

Great Cormorants bred across the country, but the largest colonies were located in coastal areas of the Baltic Sea, especially around the lagoons and estuaries of Mecklenburg-Western Pomerania (Fig. 15.1). The majority of Great Cormorants were nesting in the northern parts of Germany in the federal states of Mecklenburg-Western Pomerania (51 %), Schleswig-Holstein (11 %) and Lower Saxony (7 %) (Fig. 15.2). In the inland parts of Germany most Great Cormorants are associated with the large river systems of Rhine, Weser, Elbe, Havel and Oder (Fig. 15.1). Together these inland regions hosted about 30 % of the Great Cormorant population. About 90 % of all Great Cormorants breeding in Germany were nesting on trees and shrubs at sea shores, lakes and rivers, about 10 % were breeding on the ground or on artificial structures (e.g. ship wrecks).



Figure 15.1. Distribution and size of breeding colonies of Great Cormorants in Germany in 2012.



Colony size

In 2012, the Great Cormorants in Germany bred in 150 colonies. The largest colony had 3,856 nests and was located in Anklamer Stadtbruch in the federal state Mecklenburg-Western Pomerania. Only three colonies had more than 1,000 nests in 2012 (Fig. 15.3). They were all located close to the Baltic Sea and 36 % of the breeding population was found in these three colonies (Fig. 15.4). 71 % of the colonies had less than 100 nests; these colonies hosted only 15 % of all breeders in Germany.





Figure 15.3. Size distribution of Great Cormorant colonies in Germany in 2012.

Figure 15.4. Distribution of the Great Cormorant breeding population in relation to colony size in Germany in 2012.



Human intervention in colonies

Germany has no national Great Cormorant management plan. Germany consists of 16 federal states and the authorities in the 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 Great Cormorants on fish stocks, aquaculture facilities or

The Great Cormorant colony in Goitzsche See, a former open pit surface coal mine, May 2008. Photo: Stefan Fischer. impacts on threatened fish species. Legal actions within the scope of the decrees against the breeding population have been conducted only in a few federal states in recent years and only single colonies were affected.

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Nests near the water in the Great Cormorant colony in Rietzer See, May 2006. Photo: Tobias Dürr.

16 Status of the breeding population of Great Cormorants in Greece in 2012

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National summary

In 2012, Greece had 6,978 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 13 colonies. This is the highest breeding population of Great Cormorants recorded in Greece since recording began. Breeding numbers increased by ca. 2,400 breeding pairs compared to 2006. For one colony breeding numbers were estimated from a count conducted in 2010. Besides this, it is estimated that almost complete coverage of all known breeders was achieved in the 2012 count. It was not possible to count breeders in two small colonies that were not included in the analysis (approx. 5-30 nests in each of the colonies).

Distribution

Colonies were located in central and northern continental Greece distributed across five different regions (Fig. 16.1). The majority of breeding Great Cormorants (86 %) were nesting in Central Macedonia (5,983 nests in four colonies; Fig. 16.2). A further 12 % of the nesting population (848 nests in five colonies) was located in Western Macedonia. The remaining 2 % was distributed across three regions: Eastern Macedonia - Thrace (137 nests in two colonies), Western Greece (6 nests in 1 colony) and Thessaly (4 nests in 1 colony).

Around 90 % of all the Great Cormorants breeding in Greece were nesting in trees. The remaining 10 % were nesting on the ground (two colonies on sand islets and two colonies in reed beds). The majority of colonies (eight), including the largest ones, were located on inland, artificial and natural, lakes (Fig. 16.1). Three colonies were situated in coastal areas and two along river floodplains.



Figure 16.1. Distribution and size of breeding colonies of Great Cormorants in Greece in 2012.



Colony size

In 2012, the Great Cormorant population bred in 13 colonies – that is the highest number of active Great Cormorant colonies recorded in Greece, to date. The largest colony had 4,730 nests (68 % of the total breeding population in 2012) and was located in Central Macedonia (Kerkini Lake). Three colonies had more than 300 nests (302-784 nests) (Fig. 16.3) and 22 % of the total breeding population was found in these three colonies (Fig. 16.4). Five colonies had fewer than 100 nests (4-59 nests), and these colonies had only 1 % of all breeders in Greece. The remaining four colonies of 101-300 nests held 9 % of the breeding population.





Figure 16.3. Size distribution of Great Cormorant colonies in Greece in 2012.

Figure 16.4. Distribution of the Great Cormorant breeding population in relation to colony size in Greece in 2012.

Human intervention in colonies and other factors

No management actions were carried out to control the numbers of nesting Great Cormorants and there were no records of human interference in Great Cormorant colonies in 2012 in Greece. However, occasionally, fishermen in certain sites (especially in lagoons at Thrace and western Greece) shoot Great Cormorants when they approach fish wintering channels. These wintering channels, at Porto Lagos lagoon, in Thrace, are up to 2 km long and 40 m across and give shelter to up to 300 t of small fish (below market size) through the cold season. The number of birds shot is unknown since the shooting of Great Cormorants is not legally permitted in Greece. One small colony in a recently restored lake (Karla Lake in Thessaly) failed in 2012 due to an increase in water levels which flooded all nests with their eggs or nest-lings.

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The Great Cormorant colony in the Axios Delta, June 2013. Note the presence of Pygmy Cormorants *Microcarbo pygmaeus* and a Eurasian Spoonbill *Platalea leucorodia*. Photo: S. Kazantzidis.

17 Status of the breeding population of Great Cormorants in Hungary in 2013

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National summary

In 2013 it was estimated that there were 2,500 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in a total of 20 colonies in Hungary (range 2,499-2,519). All colonies were counted by employees of the Hungarian National Park Directorates (rangers and wildlife biologists). The survey obtained full coverage of all known breeders in the country. A slight decline has been detected since 2012 when there were ca. 2,661 breeding pairs in 22 colonies in Hungary (range 2,641-2,681). In 2013 four colonies were located very close to the present border of Hungary. One was situated on the River Danube, on the border between Hungary and Slovakia, close to the Hungarian village Süttő but in Slovakian territory (not included in this report). Two additional colonies are situated on the River Danube but in Hungarian territory and another one is on the Dráva river on the border close to the Croatian village of Donji Miholjac, but inside Hungary (these colonies were included in this work).

Distribution

Colonies were located in all the suitable wetlands of Hungary (Fig. 17.1). The majority of the breeding population was located around Lake Balaton (5 colonies, 802 nests) and along the great rivers of Hungary (Danube River, Tisza River and the affluent rivers Bodrog and Dráva) (Fig. 17.2). These sites held 91 % of the national population in 2013. The remaining 9 % of the population was located in small colonies in north-western and eastern Hungary, typically at lakes.

Over 94 % of the Great Cormorants in Hungary nest in trees, mainly in floodplain forests and on forested islands of rivers and lakes. The Great Cormorants breed mainly in willow (*Salix* sp.), poplar (*Populus* sp.) and ash (*Fraxinus* sp.) trees. One colony was situated on the alkaline ground of a fish pond island (Hortobágy). Another colony was located on floating fens in reed beds (Kis-Balaton), and some of the nests in one colony were situated on former electric pylons (Várpalota).



Figure 17.1. Distribution and size of breeding colonies of Great Cormorants in Hungary in 2013.



After the extinction of the Great Cormorant as a breeder in Hungary in the beginning of the 20th century, the Great Cormorant recolonized one part of the country (Kis-Balaton) in 1947 (10 pairs).

This colonization event took place a few years after the destruction of a huge colony in Slovakia near Bratislava (Danube River). Until the 1970s the Kis-Balaton colony was the only known breeding site in the country. Since then, the population has increased and spread to the initial suitable habitats of Hungary, mostly floodplain forests (Faragó 2009). In the 1990s the population reached 1,700-1,800 pairs and between 1999 and 2001 the number of breeders remained stable at ca. 3,200 pairs (3,192 pairs in 1999, 3,185 pairs in 2000 and 3,285 pairs in 2001) (Oláh et. al. 2003). Since the Millennium the breeding population has been declining slightly.

Colony size

In 2013 the Great Cormorant population declined to 20 colonies, compared to the 22 colonies counted in 2012. The largest colony held 470 nests (19 % of the total breeding population in Hungary) and was located on the River Danube close to Dunasziget near the Slovakian border. Three other colonies contained 200-300 nests and two colonies contained 150-200 nests (Fig. 17.3). The six largest colonies contained more than two thirds of the national population (Fig. 17.4).





Figure 17.3. Size distribution of Great Cormorant colonies in Hungary in 2013.

Figure 17.4. Distribution of the Great Cormorant breeding population in relation to colony size in Hungary in 2013.

Human intervention in colonies and other factors

In spite of the continuous decline of the breeding population of Great Cormorants in Hungary since the Millennium, there is strong pressure from the piscatorial sector to control the population. There are 36,000 hectars of fish ponds in Hungary which focus mainly on carp production. In relation to the area of the country this is the second highest in Europe after the Czech Republic. In Hungary the Great Cormorant belongs to the list of species of Community Importance with special legislation. Great Cormorants can be hunted without permission, but only in fish pond areas outside national protected areas and Special Protection Areas (SPA), between the 1st of September and the 31st of January. According to current legislation and standard practices of the Nature Conservation authorities, hunting permits can be issued for the Great Cormorant by the authorities upon request from fish pond owners. Permissions can also be given to fish ponds located inside protected areas and SPAs and during the breeding season of Great Cormorants. In 2012 a total of 7,698 individuals were shot on feeding areas, natural water bodies and fish pond systems in Hungary, which equates to more than one fourth of the combined breeding and wintering population.

In Hungary management activities generally do not take place in Great Cormorant colonies, due to the number of strictly protected species breeding in close proximity. The colonies are mainly situated on protected areas, SPAs and Ramsar sites. The colonies are in some cases mixed with protected and strictly protected species, like Little Egret (*Egretta garzetta*), Night Heron (*Nycticorax nycticorax*) and Grey Heron (*Ardea cinerea*). Even the monospecific Great Cormorant colonies are usually situated quite close to mixed heron-ries including Pygmy Cormorant (*Phalacrocorax pygmeus*) and Spoonbill (*Platalea leucorodia*) or White-tailed Eagle (*Haliaeetus albicilla*) nests.



Great Cormorants breeding on former electric pylons at Várpalota, Hungary, 2013. Photo: Lajos Nagy. However, in 2013 management activities took place in three colonies under the strict control of national park employees. At Tisza-tó hunting permits were issued to the local fishing company to shoot fully grown nestlings; fewer than 150 birds were shot. In the Kis-Balaton area permission was granted to oil eggs; 200 nests were managed in this way. These actions led to approximately a 50 % reduction in breeding success in the Kis-Balaton colonies.

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18 Status of the breeding population of Great Cormorants in Iceland in 2012

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National summary

In the summer of 2012, Iceland had 4,772 breeding pairs of Great Cormorants (*Phalacrocorax carbo carbo*) in 49 colonies. This is a continuation of the slight decline seen since the population peaked in 2010 (5,250 pairs in 2010; 4,954 pairs in 2011). Nests were surveyed using low level aerial photographs in June 2012. Full coverage is considered to have been achieved.

The Great Cormorant population in Iceland has been censused using aerial photography since 1975. At first numbers appeared to be rather stable at ca. 3,000 pairs and counts took place at irregular intervals, but after 1990 there were indications of a decline in the population and annual monitoring began in 1994. From then on, the total population has been increasing by an average of 3.7 % per year, reaching a maximum of 5,250 pairs in 2010.

Very recently, a new colony has been established on the north coast, perhaps an indication that space has become limiting in the west and that a range expansion is needed to accommodate further increases in the population. Probably what is happening now is a slow return to earlier conditions where the human factor is less important and food limitation has not yet become critical at the national scale.

Distribution

Great Cormorants were found breeding in 49 colonies along the western and north-western coasts of Iceland (Fig. 18.1). The majority of Great Cormorants (72 %) were found breeding in the Breidafjordur (Breiðafjörður) - a large bay on the west coast (Fig. 18.2). A total of 36 colonies were distributed throughout the bay, which all together hosted 3,426 pairs. The Faxaflói located on the southwest coast was home to a further 27 % of the breeding population (1,298 nests located in 12 colonies). A small proportion (1 %) was found in a single colony in Húnaflói on the north coast.



Figure 18.1. Distribution and size of breeding colonies of Great Cormorants in Iceland in 2012.

2012.



The Great Cormorant is an inshore seabird and a partial migrant in Iceland. In recent decades, its breeding distribution has been restricted to the west coast where low islets and rocks in the two large bays of Faxafloi and Breidafjördur have provided relatively safe colony sites surrounded by large areas of shallow sea. In the 19th century and the first half of the 20th century, Great Cormorant colonies were also found on sea cliffs in other coastal areas but the last of these disappeared in the 1970s. The shift in Great Cormorant distribution coincided with increased access to the west coast where a dispersed human population dependent on subsistence hunting, fishing and livestock farming was moving away and the economy was changing rapidly.

All the Great Cormorants breeding in Iceland in 2012 nested on the ground on small treeless islets, which were surrounded by the sea. In 2012 most were on low islets or rocks between 2 m and 15 m above sea level, (on average 7 m). Most islets (67 %) had less than 10 % soil cover. Islets varied in area from 0.04 to 3.23 ha. Out of the 4,772 nests, 796 (17 %) were on islets larger than 1 ha, 784 (16 %) on islets 0.5-1.0 ha, 2790 (58 %) on islets between 0.1 and 0.5 ha, and 402 (8 %) on islets <0.1 ha. The minimum distance between colonies was 2000 m. However, one new settlement was defined as a colony and not as a sub-colony, even though their nearest neighbouring colony was located within a distance of 1,000 m.

Colony size

In 2012, the Great Cormorant population in Iceland bred in 49 separate colonies. The largest colony had 254 nests and was located on Hnífsker in the north east of Breidafjordur, while the smallest colony contained only four nests. Overall, Great Cormorants bred in a large number of smaller colonies. A total of five colonies contained more than 200 nests in 2012 (Fig. 18.3) with almost one quarter of the breeding population (23 %, 1,105 nests, Fig. 18.4). Almost half of the population (46 %) bred in colonies of between 100 and 200 nests (17 colonies, 2,197 nests). A further 23 % of the breeding population (14 colonies, 1,079 nests) bred in colonies of between 50 and 100 nests, while the remaining 8 % of breeders (13 colonies, 391 nests) were found in colonies with less than 50 nests.





Figure 18.3. Size distribution of Great Cormorant colonies in Iceland in 2012.

Figure 18.4. Distribution of the Great Cormorant breeding population in relation to colony size in Iceland in 2012.

Human intervention in colonies

No management takes place in Great Cormorant colonies in Iceland. Great Cormorants are legal quarry in Iceland with a shooting season from the 1st of September to the 15th of March. Traditional killing of fledglings and taking of eggs is also legal although quickly coming to an end.

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Aerial view of the Great Cormorant colony at Belgsholtshólmi, Iceland, May 2012. Photo: Arnthor Gardarsson.

19 Status of the breeding population of Great Cormorants in Italy in 2012

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National summary

In 2012, the breeding population of Great Cormorants (*Phalacrocorax carbo sinensis*) in Italy was estimated at 3,914 breeding pairs (range 3,865-4,016) in a total of 48 colonies. This is an increase of ca. 750 nests (24 %) compared to the breeding numbers from 2011 (3,170 nests, range 3,085-3,280 nests) and an increase of ca. 1,770 nests (82 %) compared to 2006 (2,142 nests; Bregnballe et al. 2006). Two small colonies in Piedmont were not visited during the 2012 breeding season and data from the 2011 census are used in this report. It is estimated that almost complete coverage of all breeding Great Cormorants was obtained during the 2012 census. In 2012 five new colonies were discovered, ranging in size from one to 25 nests. Furthermore two sites where breeding took place in 2011 (1-2 nests) were abandoned in 2012.

Distribution

Colonies were found across the country, but the majority of colonies were located in northern Italy in the western Po plain along the Po River and its tributaries, and in freshwater wetlands and lagoons along the upper Adriatic coast (Fig. 19.1). Great Cormorants bred in 11 different regions with the largest number of breeders found in the Emilia-Romagna region. This region contained almost half of the total breeding population (44 %, 1,724 nests in 13 colonies). Large numbers of breeders were also reported in the Lombardy (22 %, 878 nests), Piedmont (15 %, ca. 600 nests) and Veneto (12 %, ca. 480 nests) regions (Fig. 19.2). Colonies located in Friuli Venezia Giulia, Tuscany, Latium, Campania and Apulia have only been established in recent years and host only a small number of breeding pairs. Small colonies in Sardinia and Sicily were found in traditional breeding areas which have been occupied since the 1960s and early 1990s respectively. Breeding numbers in these colonies were more or less the same as recorded in earlier years.



Figure 19.1. Distribution and size of breeding colonies of Great Cormorants in Italy in 2012.



Number of nests

Colony size

In 2012, the Great Cormorant population in Italy bred in 48 colonies. The largest colony contained 1,075 nests and was located in the Punte Alberete nature reserve on the southern side of the Po river delta. This single colony, founded in 1995, contained almost one third (27 %) of the national breeding population. Since the end of the 1990s this colony has been the largest colony in Italy and the only one to contain more than 400 nests. There were 14 colonies of intermediate size (i.e. with 51-400 nests) which held over half of the breeding population (57 %, ca. 2,240 nests). The majority (33) of the Italian Great Cormorant colonies contained less than 50 nests (Fig. 19.3) and together these had only 15 % of the total population of breeders (Fig. 19.4).



Figure 19.3. Size distribution of Great Cormorant colonies in Italy in 2012.

Figure 19.4. Distribution of the Great Cormorant breeding population in relation to colony size in Italy in 2012.

1-50 nests

15%

57%

Almost all Great Cormorants breeding in Italy were nesting on stand of hygrophilous vegetation. Breeding took place in flooded marshlands and on river banks or small islets in freshwater wetlands and lagoons. Great Cormorants built their nests on tall trees including white poplar (Populus alba), white willow (Salix alba), elm (Ulmus sp.) and ash (Fraxinus sp.) or hedgerows of bushy tamarisk (Tamarix sp.) and grey willow (Salix cinerea). The only exception is the colony located on the west coast of Sardinia (see photo) where Great Cormorants build their nests on sea cliffs as is typical of shags (Phalacrocorax aristotelis desmarestii; also breeding in the area) and of the nominate sub-species of the Great Cormorant P. c. carbo breeding along the Atlantic coasts of France, United Kingdom, Ireland, Iceland and Norway.

Human intervention in colonies and other factors

In Italy, the majority of the breeding colonies (85 %) are located in areas protected by law and are not subject to any management actions aiming to reduce or stop Great Cormorants from breeding. Most colonies are located in nature reserves (19 colonies) and/or regional or national parks (10 colonies). At least 40 colonies are found in areas which are part of the Natura 2000 network. Thus complete breeding failure is pretty rare and in 2012 occurred only in four small and recently established colonies. In two reservoirs nests were abandoned due to large changes in water levels, while in another colony Great Cormorants abandoned the nests after being harassed by a helicopter involved in fire fighting. Finally, 3-4 pairs trying to breed in a fish pond area were discouraged by the land owner.

Discussion

In the six-year period since the last national census in 2006 the number of Great Cormorant colonies has tripled (from 16 to 48) and the number of nests counted almost doubled (from 1,770 to 3,914 nests). However, 26 years after Great Cormorants established a colony in Val Campotto starting the colonization of continental Italy (Spina et al. 1986, Carpegna et al. 1997), the overall number of birds nesting in Italy is only about 1 % of the overall estimated European population. The breeding population is small compared to the number of Great Cormorants wintering in Italy, estimated at 50,000-60,000 birds (i.e. 10-15 % of the European population). The Great Cormorants overwintering in Italy are found in a variety of habitats, from the Alps to the Mediterranean environment of Sicily and Sardinia, using several hundred night roosts and foraging in alpine lakes and rivers, inland freshwater wetlands, coastal brackish lagoons and shallow sea waters.



Great Cormorants nesting in trees on a cliff at Lake Bolsena, Italy 2011. Photo: Massimo Brunelli.

The size of the breeding population seems to be regulated mainly by two factors: food availability around the colony, which acts at a local level (e.g. the oldest colonies of Val Campotto, Punte Alberete, and those in West Sardinia and the upper Po River in Piedmont) and limited availability of protected breeding sites where Great Cormorants can breed without being disturbed directly (e.g. colony harassment) or indirectly (e.g. hunting activities). Undisturbed areas are required for almost a six-month period lasting from the early stages of colony occupation and egg laying, starting in mid-January, to chick fledging occurring up to the end of July and later in new colonies. In the past direct actions to destroy nests or to prevent breeders from starting to nest were carried out in several colonies in the Lagoon of Venice and the Po Delta. These actions resulted in Great Cormorants abandoning the breeding site or ceasing breeding activity (Serra & Brichetti 2002).

The effects of human activities on both the distribution and size of Great Cormorant colonies seems rather clear. Several areas regularly occupied in winter by very large numbers of Great Cormorants do not have any breeding colonies (i.e. natural lakes and reservoirs in central Italy, coastal wetlands in southern Sardinia and the core area of the Po Delta). Additionally almost all Great Cormorant colonies are located in protected sites where long-established colonies of Grey Heron (*Ardea cinerea*) and other colonial species of Ciconiiformes (herons, egrets, spoonbill and ibis) exist. Probably the Great Cormorants use the presence of colonies of these other species as an indication of safety against human disturbance.

Measures taken to scare away Great Cormorants from aquaculture and other fishing areas, as well as from rivers and basins managed by anglers, are likely to continue in coming years. The number of Great Cormorants breeding in Italy will therefore, probably, remain rather small compared to the number overwintering Great Cormorants. Furthermore, most colonies are likely to remain within the range of 1-100 nests and new colonies will probably only be established in protected areas and/or inside colonies of Grey Herons and other colonial Ardeidae. Overall, the breeding population of Great Cormorants in Italy will remain well below the potential natural carrying capacity of our wetlands.

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Panoramic view of a portion of the Great Cormorant colony at Punte Alberete, Italy in 2012. Photo: Stefano Volponi.

20 Status of the breeding population of Great Cormorants in Latvia in 2012

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National summary

In 2012, Latvia had an estimated 3,106 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in nine colonies. A total of 2,634 nests were counted, with the total coverage of all breeders estimated at 80 %. This is an increase of approximately 600 pairs compared to 2011. It is possible that some unknown colonies exist, especially in the eastern and south-eastern parts of the country. These areas contain a large number of water bodies and are rarely visited by ornithologists. Additionally, very little Great Cormorant research has been carried out in Latvia before 2009. During research in 2012 some potential breeding areas were visited, but no signs of breeding were found. Further research will continue in the 2013 breeding season.

Distribution

The breeding colonies were found across the country, at both inland and coastal sites. The largest colony was located on an island in a coastal lake named Kanieris, 6 km from the south-western coast of the Riga Gulf (Fig. 20.1). The majority of Great Cormorants (71 %, 1,861 nests) were breeding in the Kurzeme region located in western Latvia, bordering the Baltic Sea (Fig. 20.2). The Latgale region in the east, which borders Belarus and Russia, contained 29 % of breeders (765 nests), while a small number (8 nests, 0.3 %) were found in the central Zemgale region. One colony (Lubans Lake) was located on the border between two regions (Vidzeme and Latgale), but was assigned to the Latgale region for ease of analysis and presentation.

In Latvia in 2012, Great Cormorants built their nests both on the ground and in trees. 11 % were found nesting on the ground on small islets at Engure Lake, while the remaining breeders nested in the trees. There were two sea colonies in the Kurzeme region; one located at Pape (an old shipwreck) and one on the islet where the Kolka lighthouse is situated (located approximately 5 km from the coast).



Figure 20.1. Distribution and size of breeding colonies of Great Cormorants in Latvia, 2012.

2012.



Number of nests

Colony size

Only three colonies in Latvia had more than 100 nests in 2012 (Fig. 20.3). The majority of the breeding population (93 %) was found in these three colonies located at lakes Kanieris, Lubans and Engure (Fig. 20.4). The remaining colonies contained less than 100 nests, and these colonies had 7 % of all breeders in Latvia. The nests in Engure Lake colony were counted by ornithologists from the Laboratory of Ornithology (Institute of Biology, University of Latvia) and later by the author.





Figure 20.3. Size distribution of Great Cormorant colonies in Latvia in 2012.





The author with a fledged young at Lubans Lake, Latvia, July 2012. Photo: Karlis Millers.

Human intervention in colonies

Management is now carried out in two areas in Latvia where conflicts with fisheries are intense. The Nagli fish pond fishery has requested annual permits from the authorities (Nature Conservation Agency) to shoot approximately 50-70 Great Cormorants for the last four years (possibly longer), with the number of permits (relating to the number of birds allowed to be shot) varying from year to year. Permission was granted in 2012. The shooting takes place after the waterfowl breeding season (July) in the fish ponds territory, which is a complex containing more than 27 ponds of different sizes located approximately 13 km southwest of the Lubans Lake colony. The main aim of the shooting is to reduce the number of feeding birds at the fish ponds. The Dagda country authority has requested permits to shoot Great Cormorants in 2012 and 2013.

In 2012 in Latvia, the authorities permitted management of the Great 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 in 2012 and possibly earlier. In some areas, human disturbance during the start of the breeding season caused Great Cormorants to abandon the colony (Aluksne Lake in Vidzeme region).

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Great Cormorant nests low in the trees at Kanieris lake, Latvia, June 2012. Photo: Karlis Millers.

21 Status of the breeding population of Great Cormorants in Lithuania in 2012

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National summary

In the summer of 2012, Lithuania had an estimated 3,200 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in six colonies. A total of 3,004 nests were counted, but a small number of colonies located in the Nemunas river delta could not be surveyed due to limited access. Despite this, it is estimated that the count resulted in an almost complete coverage (>90 %) of all breeding Great Cormorants in Lithuania. There were approximately 1,000 fewer nests in 2012 than in 2011, primarily due to nest management measures taken in selected colonies.

Colony distribution and size

In 2012, Great Cormorant nests were counted in six colonies (Fig. 21.1). The largest colony was located on the Curonian Spit near Juodkrante, which is located on Lithuania's western coast, bordering the Baltic Sea. This colony contained 2,463 nests - 82 % of the national breeding population. The remaining five colonies ranged in size from 1 to approximately 200 nests and were located in central and north-eastern Lithuania (Fig. 21.2). The five smaller colonies contained 18 % of the breeding population (Fig. 21.3).

In 2012, as in all previous years, 100 % of all the Great Cormorants breeding in Lithuania were nesting in trees. The majority of nests were located in pines, some nests in spruce and black alder, and only a few nests in birch.



Figure 21.1. Distribution and size of breeding colonies of Great Cormorants in Lithuania in 2012.





Figure 21.2. Size distribution of Great Cormorant colonies in Lithuania in 2012.

Figure 21.3. Distribution of the Great Cormorant breeding population in relation to colony size in Lithuania in 2012.

Human intervention in colonies

In 2012, human intervention took place in all Lithuania's colonies holding more than 100 breeding pairs. The greatest effect of intervention was in the largest colony near Juodkrantė. As a result of these actions, almost 1,000 Great Cormorant nests were abandoned in the breeding season. Furthermore, there were approximately 1,000 fewer pairs attempting to breed in this colony in 2012 compared to 2011 – probably also as a result of nest management measures implemented in previous years.

Management is carried out in all the Lithuanian breeding colonies that contain 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 Great 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).
22 Status of the breeding population of Great Cormorants in Montenegro in 2012

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National summary

In 2012, Montenegro had 1,156 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in a single colony. Over the period from 2006-2012, the breeding population in Montenegro has decreased by 1%. All previously known breeding locations of Great Cormorants in Montenegro were visited during the breeding season in 2012. The only active colony of Great Cormorants was located on the Skadar Lake in Pančeva Oka reserve, near the Albanian border.

Distribution

In Montenegro, breeding Great Cormorants have been recorded on several sites in the south of the country along the Skadar Lake and Bojana River system. Skadar Lake is the largest lake on the Balkan Peninsula covering an average of 391 km² (area ranges from 370 km² in the late summer to 600 km² in winter). The location and size of Great Cormorant colonies at Skadar Lake varies from year to year but the largest and most stable colony is Pančeva Oka. Besides Skadar Lake, colonies used to exist on Šasko Lake, Paratuk Ait and the barrier island River Bojana. These sites were visited during the 2012 survey but no active breeding was evident. Thus, in 2012 Montenegro had only a single colony located on Skadar Lake (Fig. 22.1).



Great Cormorant roosting site at Ckla, Montenegro, March 2013. Photo: Andrej Vizi.



Figure 22.1. Location of the breeding colony of Great Cormorants in Montenegro in 2012. Source: National History Museum of Montenegro.

In central Montenegro Great Cormorants commonly feed on the ponds and wetlands along Zeta River and Nikšić accumulations, but no evidence of breeding was found in 2012. Additional information was obtained from the National Biodiversity Research Programme in 2012 which confirmed that no Great Cormorants were breeding in northern Montenegro.

The colony within the Special Nature Reserve Pančeva Oka was first discovered in 1998. Since then, this is the largest and most stable Great Cormorant breeding colony on the lake (breeding numbers here were almost as high in 2012 as in 2005). Intermittent colonies were recorded on Skadar Lake over the last six years, but in 2012 only this colony was active. Revisiting Skadar Lake on several occasions during the summer in 2012 confirmed that no other colonies were present.

Human intervention in colonies

Great Cormorants are not regarded as a game species in Montenegro, although some illegal hunting still occurs at the national park borders. Conflicts have existed between Great Cormorants and commercial fisheries on the lake for many years, and it is known that organized destruction of a former colony took place in 1970. Since then, there have been no reports of management actions in Great Cormorant colonies.



Great Cormorants roosting at Skadarsko jezero, Grmozur, Montenegro, January 2007. Photo: Ondrej Vizi.

Besides Great Cormorants, the Pančeva Oka reserve also hosts a breeding colony of the Dalmatian Pelican (*Pelecanus crispus*) as well as other breeding waterbirds. The Dalmatian Pelicans are known for "loose symbiosis" with Great Cormorants in regard to where they breed and forage. Thus it would be very difficult to carry out any Great Cormorant control measures in this area without also disturbing the pelicans. Illegal fishing and low level peat extraction is carried out in the area by local people.

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23 Status of the breeding population of Great Cormorants in The Netherlands in 2012

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http://dce2.au.dk/pub/SR99.pdf

National summary

In 2012, The Netherlands had 23,556 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 78 colonies. This number is very similar to totals recorded since 2001, with an average of 22,500 breeding pairs. The total number of colonies has been slowly growing by 2-3 colonies per year over the last 12 years (SOVON data). Together with the stabilization of the total numbers, this indicates a slight redistribution rather than expansion in the Great Cormorant breeding population.

Distribution and colony size

The majority of the Dutch Great Cormorant colonies are situated in the areas with larger water bodies and in the coastal zones in the western part of the country. The larger colonies are located in the IJsselmeer area since at least the 1970s and nowadays also in the coastal areas of the Wadden Sea and the North Sea (Fig. 23.1). These regions contain the largest surface of (shallow) water. The IJsselmeer area and the coastal zone also included the majority of breeding Great Cormorants in the Netherlands in 2012, a total of 77 % of the population (Fig. 23.2). Most Great Cormorant colonies in The Netherlands are situated in marshes and the nests are built in trees, often willow or elder. In a small number of colonies (mostly on islands) the Great Cormorants are breeding on the ground.

The overall picture of the breeding colonies in the Netherlands shows a strong relationship between colony size and the size of the foraging waters. The larger colonies (with more than 500 nests) occur around the largest water bodies and coastal areas with more shallow water areas. Average sized colonies (101-500 nests) are located in the regions with intermediate sized water bodies (besides a part of the coastal zone, the delta area, inland lakes and large rivers). The inland parts of the country contain the smallest areas of foraging waters and have only small colonies (1-100 nests) (Figure 23.1).



Figure 23.1. Distribution and size of breeding colonies of Great Cormorants in The Netherlands, 2012.



Number of nests

The same relationship between colony size and water body size has been observed with relation to the colonization and redistribution of breeding Great Cormorants over the last 40 years. Great Cormorant population growth started in the IJsselmeer area in the 1970s and 1980s. After a strong decline in breeding numbers in the IJsselmeer area in 1994, a period of stabilization and redistribution followed. In the late 1990s other large water systems (e.g. large lakes and rivers, parts of the delta area and parts of the coastal zones) were colonized and breeding numbers started to increase, in turn being followed by stabilization and redistribution in the 2000s. This resulted in numbers declining in both early colonized areas and the older colonies located on the larger water bodies. At the same time colonization and growth occurred in other regions and in new colonies. As a result, the Dutch Great Cormorant population remained stable after the shifts between regions and within regions and this development seems to be a continually repeating process with new colonies still appearing every year.

This development is illustrated by the distribution of colony sizes in 2012 (Fig. 23.3). Approximately three quarters of all Dutch colonies were small, containing up to 250 nests (59 colonies; 76 %) and had 20 % of the Dutch breeding population (Fig. 23.4). Almost one fifth of colonies were of intermediate size containing between 251 and 1,000 nests (13 colonies; 17 %), housing 33 % of the national population. Six colonies contained more than 1,000 nests, and had 47 % of the Dutch population. Among the six largest colonies, three contained ca. 1,100 nests and the remaining three contained ca. 2,500 nests. The three colonies with approximately 2,500 nests were situated in the IJsselmeer area. These colonies were located on the island de Kreupel, on the de Vooroever nature development area at the northern side of the IJsselmeer lake, and in Oostvaardersplassen nature area at the southern side of the IJsselmeer lake. The larger colonies in 2012 were much smaller than in the 1980s and 1990s, when colonies of up to 5,500 nests (in one case over 8,000) were recorded.





Figure 23.3. Size distribution of Great Cormorant colonies in The Netherlands in 2012.

Figure 23.4. Distribution of the Great Cormorant breeding population in relation to colony size in The Netherlands in 2012.

Human intervention in colonies and other factors

The majority of breeding Great Cormorants in The Netherlands are situated in Natura 2000 sites. No significant conflicts with commercial fisheries occur at present in the Netherlands. Most commercial fisheries are aware that Great Cormorants are not the main problem concerning the general decline of the commercial fish catch. The fact that the Netherlands have no active management or regulation of breeding numbers is unique in Europe. This shows that communication about the ecological position of Great Cormorants and other fish-eating birds can result in a better understanding of a changing world.

In some cases, however, local governments are still confronted with the wish to act. Those cases often occur on a very local scale (small fish ponds) or concern sports fishermen, often related to the stocking of fish in small rivers. Those local problems occur mostly in areas with small numbers of Great Cormorants.

Acknowledgements

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A small section of the large Great Cormorant colony at Oostvaardersplassen, June 2011. Photo: Stef van Rijn.

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Stef van Rijn and Mervyn Roos counting nests in the colony at Oosvaardersplassen, The Netherlands, 2004. Photo: Florian Möllers.

24 Status of the breeding population of Great Comorants in Norway in 2012 with regard to the continental sub-species *Phalacrocorax carbo sinensis*

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National summary

The sub-species *Phalacrocorax carbo sinensis* is breeding on islets along the coast in southern Norway. In 2012, Norway had an estimated 2,500 breeding pairs of this Great Cormorant sub-species in 14 colonies. This is an increase of approximately 600 breeding pairs (32 %) since 2010. Since the first breeding of the sub-species *P. c. sinensis* in southern Norway in 1996/97 (45 pairs) there has been a steady population growth up to 2012 (Fig. 24.2).

Other sub-species

According to Marion & Le Gentil (2006), two other sub-species of Great Cormorants are also breeding in Norway. Until recently it was believed that the only other sub-species breeding in Norway besides *P. c. sinensis* was *P. c. carbo*, which breeds on skerries and cliffs along the coast from Hordaland on the southwest coast to the Russian border in the northernmost part of Norway. However, based on the sequencing of mtDNA extracted from feathers of Great Cormorant chicks in Norway, Marion & Le Gentil (2006) suggested that a hitherto undiscovered sub-species, named *P. c. norvegicus*, was breeding in the northern part of Norway (from the Lofoten islands towards the north). This study also indicated that *P. c. norvegicus* was breeding in other countries along the North Sea, but in lower numbers than in Norway. The 2012 breeding population of the sub-species *P. c. carbo* and the presumed *P. c. norvegicus* was estimated at 19,000 breeding pairs distributed among 153 colonies (for futher details see Chapter 25).



Figure 24.1. Distribution and size of breeding colonies of Great Cormorants (P. c. sinensis) in Norway 2012.



Figure 24.2. Development of the breeding population of Great Cormorants (*P. c. sinensis*) in Norway from the time of establishment (1996/97) to 2012.

Distribution and colony size

Colonies of the sub-species *P. c. sinensis* were found along the coast from Rogaland (south-western tip of Norway) to Østfold close to the Swedish border (Fig. 24.1). The largest colonies were located in the eastern part of Skagerrak from the southern tip of Norway to the Swedish border and these had 80 % of the population. Rogaland in the west accounted for 20 % of the nests. Most of the nests were situated on the ground, on small islands along the coast.

In 2012, Great Cormorants bred in 14 colonies (compared to nine colonies in 2010). The largest colony, founded in 1997, had 820 nests (34 % of the national population) and was located in Østfold close to the Swedish border. This was the only colony with more than 500 nests.

Almost half of the breeding colonies (six colonies) contained less than 100 nests (Fig. 24.3) and these colonies had only 9 % of the national population (Fig. 24.4). The remaining colonies contained between 100 and 500 nests and held 57 % of the national population.



Figure 24.3. Size distribution of Great Cormorant (*P. c. sinensis*) colonies in Norway in 2012.



Figure 24.4 Distribution of the Great Cormorant (*P. c. sinensis*) breeding population in relation to colony size in Norway in 2012.

Human intervention in colonies

In Norway, Great Cormorants breed on small islands along the coast (except for one colony in Rogaland), and until now there have, in general, been relatively few conflicts with fisheries. The only conflicts have been in Østfold (the easternmost colony) where fishermen claim Great Cormorants eat a lot of small cod (*Gadus morea*). However, two diet studies showed that Great Cormorants feed mainly on fish from the Labridae family but the frequency of cod in the Great Cormorants' diet increased from 2002 to 2012 (Skarprud 2003, Sørensen 2012). There have been an increasing number of observations of Great Cormorants on inland water bodies, and it is expected that the conflicts with fisheries (especially recreational fisheries) will increase over the coming years.

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Great Cormorant colony of P. c. sinensis at 'Storskarven' in Vestfold county near Olso, Norway, 2012. Photo: Rune Bergstrøm.

25 Trends and status of the breeding population of Great Cormorants in Norway with regard to the Atlantic sub-species *Phalacrocorax carbo carbo*

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National summary

The sub-species of Great Cormorant *Phalacrocorax carbo carbo* and the presumed *P. c. norvegicus* are breeding on islets along the coast of Norway from the Russian border in the north to Hordaland in the south. So far the breeding distribution of these two sub-species has not overlapped with the breeding distribution of *P. c. sinensis*. In 2012 the breeding population of *P. c. carbo* and *P. c. norvegicus* was estimated to contain 19,000 breeding pairs in 153 colonies. This estimate is based on counts of individual colonies that took place during various years between 2007 and 2013. The long-term trend from ca. 1980 to 2012 was positive or stable for the monitored colonies, whereas for the last 10 years (2002-2012) most of these colonies have decreased by an average of 7.8 % per annum.

Sub-species

According to Marion & Le Gentil (2006), three sub-species of Great Cormorants are breeding in Norway. Until recently it was believed that the only other sub-species breeding in Norway besides *P. c. sinensis* was *P. c. carbo*, which breeds on skerries and cliffs along the coast from Hordaland on the southwest coast to the Russian border in the northernmost part of Norway. However, based on the sequencing of mitochondrial DNA extracted from feathers of Great Cormorant chicks in Norway, Marion & Le Gentil (2006) suggested that a previously undiscovered sub-species, named *P. c. norvegicus*, was breeding in the northern part of Norway (from the Lofoten islands towards the north). This study also indicated that *P. c. norvegicus* was breeding in other countries along the North Sea, but in lower numbers than in Norway. In the following text all reference to Great Cormorants or *P. c. carbo* refers to the breeding population of *P. c. carbo* / *P. c. norvegicus*. For information regarding the 2012 population of the *P. c. sinensis* sub-species see chapter 24 in this report.



Figure 25.1. Distribution and size of breeding colonies of Great Cormorants in Norway in 2012, not including the colonies of *P. c. sinensis* in southern Norway. Each circle represents nest numbers recorded in individual colonies, using data from the most recent count (2007-2013).

Distribution and colony size

It is extremely demanding to monitor the entire breeding population of the sub-species *P. c. carbo* in Norway. The breeding locations are dispersed in 150-200 localities, which are usually isolated islets and cliffs difficult to access. Most of the colonies between Central Norway and south of Lofoten, and along the north shores of Lofoten, are monitored annually using aerial photography, whereas the colonies in West-Finnmark are monitored from boats.

Figure 25.2. Regional distribution of the breeding population of Great Cormorants in Norway, not including the colonies of *P. c. sinensis* in southern Norway. The relative distribution is based on the most recent counts during 2007-2013.



In 2012 the majority of the Great Cormorants (*P. c. carbo*) breeding in Norway were found in the shallow areas of Trøndelag (Sør and Nord-Trøndelag, Central Norway) and Helgeland (Nordland county, southern district in Northern Norway), but many colonies were also located along the coast of Vesterålen (northern Nordland) to Finnmark (extreme northeast) (Fig. 25.1, 25.2). On the coast of Trøndelag and Helgeland colonies were located on small islets in the outer archipelago. These colonies are often large, containing up to a few thousand nests. Farther north, the colonies are usually smaller and are often located on cliffs facing the sea. In Finnmark, it is common for Great Cormorants to nest on cliffs and steep mountain slopes, also on the mainland. In Eastern Finnmark especially, colonies can be found in the fjords.

In 2012 there were an estimated 153 active Great Cormorant colonies along the coast of Norway, slightly fewer than the previous years. The largest colonies held ca. 1,200 nests and were located in the county of Nordland. These colonies contained almost 20 % of the Norwegian breeding population (Fig. 25.4). The majority of colonies (61 %) were much smaller, containing less than 100 nests (Fig. 25.3) and these colonies had only 11 % of breeders (Fig. 25.4).

Population development

The development of breeding numbers has been monitored annually in selected areas along the coast since 1980. The entire Norwegian breeding population of Great Cormorants was estimated at 21,000 pairs in 1983-1986 (Røv & Strann 1987). The breeding population increased to c. 27,000 pairs in 1995 (Røv 1997) before dropping to c. 25,000 pairs in 2000 (Røv et al. 2003). The sub-species *P. c. sinensis* began breeding in Norway in 1996. By 2005 the breeding population was estimated at 30,000 pairs (Barrett et al. 2006) of which fewer than 3 % belonged to the *P. c. sinensis* sub-species. For this year it was estimated that there were 20,000 pairs breeding in the Norwegian Sea and 10,000 pairs in the Barents Sea. After 2005 the population decreased and by 2012 it was estimated at 19,000 pairs (excluding *P. c. sinensis*), with 14,000 pairs in the Norwegian Sea and 5,000 pairs in the Barents Sea.





Figure 25.3. Size distribution of Great Cormorant colonies in Norway, not including the colonies of *P. c. sinensis* in southern Norway.

Figure 25.4. Distribution of the Great Cormorant breeding population in relation to colony size in Norway, not including the colonies of *P. c. sinensis* in southern Norway.

The long-term trend (1980-2012) was increasing or stable for all of the monitored colonies and areas, except within the nature reserve of Froan outside Frøya, central Norway and Vesterålen, on the north side of the Lofoten islands (Table 25.1). For the last ten years, however, decreasing or stable trends were the most common. On average, the annual rate of change for the period from ca. 1980-2012 was -0.1 % per annum (SD = 6.65), whereas for the last 10 years (2002-2012) the annual rate of change was -7.8 % per annum (SD = 14.84).

Human intervention in colonies and other factors

Many of the Great Cormorant colonies in Norway are situated within protected areas. However boat traffic close to the colonies is normally not regulated and may cause disturbance that scares adults off their nests and this may allow gulls to predate eggs and small chicks. Also an increasing population of White-tailed Eagles (*Haliaeetus albicilla*) sometimes cause disturbance that might lead to gull predation on Great Cormorant nests. Direct predation by White-tailed Eagles has been rarely observed. Great Cormorants can be hunted in the whole country from the 1st of October to the 30th of November, but in Central Norway only juveniles can be hunted.

Acknowledgements

A number of people are involved in counting Great Cormorants in Norway. A huge thank you to everybody, especially N. Røv who has counted Great Cormorants annually since the late 1970s. **Table 25.1.** Analyses of population trends for the Great Cormorant (*P. c. carbo* and *norvegicus*) in areas along the Norwegian coast. The table lists time period for the counts, number of years with counts within the time period, number of colonies and study plots within the region or colony, annual population changes (%), trend (+/0/-) and the level of significance for the estimated trend calculated using Monte Carlo simulations. *** = p < 0.01, ** = p < 0.05, * = p < 0.1, n.s. = not significant. For areas where monitoring has been carried out sufficiently long the trend for the last 10 years (2002-2012) is also indicated. Population trends are denoted as displaying a significant increase [+], a significant decrease [-], stable with a non-significant decrease [0 (-)]. Data from the National monitoring programme for seabirds.

Locality/area/county	Time Period	Number of years with	Number of colonies/	Annual change (%)	Trend	Level of significance
Sula, Frøya	1979-2012	29	4-8/0	3,2	+	***
	2002-2012	11		-3,8	0 (-)	n.s.
Grogna	1980-2012	30	9-11/0	1,1	+	*
	2002-2012	11		-4,1	-	**
Froan sør for Finnværet	1974-2012	29	4/0	-20,3	-	***
	2002-2012	11		-57,1	-	***
Froan nord for Finnværet	1974-2012	31	5/0	-0,8	0 (-)	n.s.
	2002-2012	11		-5,1	-	**
Melstein	1979-2012	30	1/0	3,7	+	***
	2002-2012	11		-5,4	0 (-)	n.s.
Vikna	1979-2012	30	7/0	-2,2	0 (-)	n.s.
	2002-2012	11		-10,9	-	**
Sklinna	1979-2012	30	5/0	2,8	+	**
	2002-2012	11		3,4	0 (+)	n.s.
Helgeland Sør	1980-2012	27	7/0	0,2	0 (+)	n.s.
	2002-2012	11		-5,4	-	**
Vega	1982-2012	28	8/0	-2,3	0 (-)	n.s.
	2002-2012	11		-10,7	-	***
Sør for Træna	1985-2012	27	2/0	2,0	+	**
	2002-2012	11		-5,0	-	*
Træna-Myken	1985-2012	26	5/0	-0,1	0 (-)	n.s.
	2002-2012	11		-3,4	0 (-)	n.s.
Røst	1997-2012	16	1-5/0	8,9	+	*
	2002-2012	11		-5,6	0 (-)	n.s.
Vesterålen	1983-2012	17	1/0	-5,7	-	***
	2002-2012	9		-12,6	-	**
Vest-Finnmark	1983-2012	28	4/0	1,5	0 (+)	n.s.
	2002-2012	11		-4,0	0 (-)	n.s.
Kongsfjord	1987-2008	20	3/0	9,1	+	***
	2002-2008	5		12,0	+	**
Sør-Varanger	1989-2012	6	11-18	-2,6	0 (-)	n.s.

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A head of a Great Cormorant of the Atlantic *carbo* sub-species and a head of an individual of the continental sub-species *sinensis* shot in Denmark. Note the difference in the gular pouch angle and the size of the bill. Photo: Thomas Bregnballe.

26 Status of the breeding population of Great Cormorants in Poland in 2012

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National summary

In 2012, Poland had an estimated 26,600 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 54 colonies. This is a negligible decrease from approximately 27,100 nests in 2010. During 2012 it was not possible to count the breeding numbers in five small colonies. In these colonies, numbers from 2010 were used. It is estimated that almost complete coverage of all known breeders was achieved in the 2012 count.

Distribution

Great Cormorant colonies were counted in a total of 12 regions in Poland (Fig. 26.1) with the majority of breeding (75 %) taking place in the three most northern regions which are located next to the Baltic Sea (Fig. 26.2). All of the Great Cormorants breeding in Poland were nesting in trees in 2012.



Figure 26.1. Distribution and size of breeding colonies of Great Cormorants in Poland in 2012. Nest numbers are provided for the largest colony.



Colony size

In 2012, the Great Cormorant population in Poland bred in 54 colonies. The largest colony had 6,450 nests and was located at Kąty Rybackie in the northern region of Pomorskie on the Baltic Sea coast. This single colony contained almost one quarter of the national breeding population (24 %) and was the largest Great Cormorant colony ever counted in north-west Europe.

The majority of colonies (43 out of 54) were much smaller, containing less than 500 nests (Fig. 26.3). Over one quarter of the breeding population (ca. 7,000 nests) was found in these 43 colonies (Fig. 26.4). The remaining three quarters of the breeding population was found in 11 colonies. Six colonies contained between 501 and 1,000 nests and had 14 % of the breeders. Four colonies contained between 1,001 and 3,000 nests and had over one third of the population, while the remaining 24 % was found in the largest colony mentioned above.



Figure 26.3. Size distribution of Great Cormorant colonies in Poland in 2012.



Figure 26.4. Distribution of the Great Cormorant breeding population in relation to colony size in Poland in 2012.

Human intervention in colonies

Management actions were carried out 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.

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27 Status of the breeding population of Great Cormorants in Romania in 2013

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National summary

In 2013 it was estimated that there were between 13,000 and 15,000 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 29 colonies in Romania (11,306 nests counted). Great Cormorant breeding numbers in Romania have declined since 2007, when ca. 17,500 nests were reported (16,455 nests in the Danube Delta; >970 nests along the river Danube; Bregnballe et al. 2011). The Romanian census carried out in 2013 surveyed eight sites along the river Danube with a specific focus on the Danube Delta. The census focused on the breeding stronghold of Great Cormorants in the country, and as a result only partial coverage at a national level was obtained. Therefore the national population was estimated based on previous experience and results from the literature. In addition to this, information on one colony, close to the Bulgarian border, was gathered by Peter Shurulinkov in 2012 during the Bulgarian national count.

Distribution

In 2013 the majority of Great Cormorants breeding in Romania (78 %) were found in the Danube Delta (Fig. 27.1). A total of 8,804 Great Cormorant nests were reported in 19 colonies in the Danube Delta, all of which were located in trees. Due to limited accessibility in some colonies, counts of breeding birds were made from a distance. In almost one third of the colonies (6 colonies), Great Cormorants were found breeding alongside other colonial species: Pygmy Cormorant (*Phalacrocorax pygmeus*), Night Heron (*Nyctocorax nycticorax*), Squacco Heron (*Ardeola ralloides*), Cattle Egret (*Bubulcus ibis*), Little Egret (*Egretta garzetta*), Great White Egret (*Egretta alba*), Grey Heron (*Ardeola ralloides*), Spoonbill (*Platalea leucorodia*) and Rook (*Corvus frugilegus*).



Figure 27.1. Distribution and size of breeding colonies of Great Cormorants in Romania in 2013.

Since 2007 the breeding population of Great Cormorants in the Danube Delta has declined markedly (16,455 nests in 28 colonies in 2007; Bregnballe et al. 2011). It is evident that many of the large colonies have migrated to the eastern part of the delta, closer to the Black Sea coast. It is believed this is due to a shortage in food supplies, also illustrated by the large number of birds encountered along the coast during the warmer seasons. (Gogu-Bogdan 1998, Kiss et al. 2008, Marinov 1995, Marinov & Hulea 1996, Platteeuw et al. 2002, 2004, 2006, Sándor et al. 2009, 2011). Evidence also indicates that many Great Cormorants from the Danube Delta region have dispersed in a fan-shaped pattern, adding to the avifauna of other countries (Sándor et al. 2009).

During the 1950s large Great Cormorant colonies with between 1,000 and 2,000 nests were present in the Danube Delta (Dragomir & Staraş 1992, Linția 1955, Marinov and Hulea 1996 Năvodaru et al. 2004, Rosetti-Bălănescu 1957). In the late 1950s and 1960s a campaign began to control numbers of fish eating birds. The ultimate goal was to increase fish production. The effects of the measures were studied (Andone et al. 1969, Păsculescu et al. 1962). This campaign resulted in the killing of many thousands of Great Cormorants, herons and egrets. Limited information is available from this time, but it is known that in 1956 alone 106,340 fish eating birds were killed, and in 1957 approval was given to kill a further 70,000 birds (Dragomir & Staraş 1992, Paspaleva et al. 1985).

As a result of this, by the late 1960s, Great Cormorants were rare breeders in the area and only a small number of colonies with ca. 10-15 nests remained in the Danube Delta (Dragomir & Inaşcu 1971, Dragomir & Almăşan 1974, Cătuneanu et al. 1978). Once the "optimization" campaign stopped the Great Cormorant population began to recover, although shooting continued to take place on fish farms. In 1990 the Danube Delta was declared a Biosphere Reserve which provided breeding Great Cormorants with additional protection. After this event, the recovery of colonial birds started and it was especially evident for Great Cormorants (Fig. 27.2).

Outside the Danube Delta approx. 2,500 nests (2,502 counted) were reported in 10 colonies at various locations along the river Danube in 2013. The colonies closest to the delta were located near the city of Brăila. Three colonies containing 572 nests were located on the Small Island of Brăila in the Muntenia region. Further upstream 690 nests were located in three colonies on the islets downstream of Calarasi, on the bank of the Danube's Borcea branch. Beyond this a single colony was located on an islet upstream from Calarasi and contained 120-140 nests (from Bulgarian count in 2012). At the confluence of the Danube and the Vedea River on the Păsărica Islet, one colony was reported with 250 nests. Further upstream close to the Suhaia Lake in Teleorman county 600 nests were reported in a colony located on two neighbouring islands. Finally at the confluence of the Danube and Olt River one colony with 250 nests was located.

In the region outside the Danube Delta there has been an increase in breeding numbers since 2007, when the population was estimated at 970 pairs in four colonies (Bregnballe et al. 2011). Other investigations have reported that Great Cormorants are colonizing the Lower Danube groves and coppices (Munteanu 1998). The increase in breeding Great Cormorants along the Danube and its large lakes and reservoirs may be linked to the availability of food, due to the many commercial fisheries located in this region (Fig. 27.3).





Figure 27.3. Regional distribution of the breeding population of Great Cormorants in Romania in 2013.



In Romania in 2013 all Great Cormorants were reported nesting in trees. The majority of nests were located in White Willow (*Salix alba*) and poplar (*Populus sp.*) trees. Upstream of the Danube Delta Great Cormorants were reported to be nesting in other tree species including Field Elm (*Ulmus minor*) and European Ash (*Fraxinus excelsior*).

Colony size

In 2013, the Great Cormorant population in Romania bred in 29 colonies. The largest colony had 1,200 nests and was located close to the village of Sfântu Gheorghe at the end of the southern arm of the Danube near the Black Sea, in the Dobruja region. The largest colony in the Danube Delta in 2007 was double this size with 2,500 nests.

In Romania in 2013 only two colonies contained more than 1,000 nests (Fig. 27.4) and 20 % of the breeding population was found in these two colonies (Fig. 27.5). A large proportion of the breeding population (62 %) was located in 12 colonies of intermediate size (251-1,000 nests) and the remaining 16 % were found in 14 small colonies with fewer than 250 nests.





Figure 27.4. Size distribution of Great Cormorant colonies in Romania in 2013.

Figure 27.5. Distribution of the Great Cormorant breeding population in relation to colony size in Romania in 2013.

Human intervention in colonies and other factors

Practically all Great Cormorant colonies in Romania are located within protected areas (Natura 2000, Biosphere Reserve, Ramsar sites, Natural Park, etc.) and no management to limit the number of nests, eggs or individuals has been carried out in Romania in the last 24 years. Disturbance of colonies by tourists and occasional shooting of Great Cormorants on fish nurseries are known but these are local and illegal actions.

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Count team exploring the shallow areas of a flooded willow forest in the Danube Delta, May 2013. Photo: Mennobart van Eerden. Cătuneanu, I.I., Korodi Gál, I., Munteanu, D., Paşcovschi, S. & Vespremeanu, E. 1978: Fauna R.S.R. – Aves 15: 1st edition. București: Academiei R.S.R. Pp. 281–286. (in Romanian)

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An early morning view of a mixed flock of White Pelicans and Great Cormorants foraging on the Danube Delta, May 2013. Photo: Mennobart van Eerden.

28 Status of the breeding population of Great Cormorants in the Russian part of the Gulf of Finland in 2012

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National summary

There were 4,605 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in seven colonies in the Russian part of the Gulf of Finland in 2012. This is an increase of approximately 18 % (706 nests) over a period of six years (3,899 nests recorded in 2006). During the 2012 count, a total of 23 islands in the Russian part of the Finnish Gulf were surveyed as part of the national Great Cormorant count. Breeding colonies were found on 15 islands. In some cases, colonies were located on islands within archipelagos and the distance between some of the colonies was relatively small (less than 2 km). Colonies located within 2 km from each other were categorized as sub-colonies. It is judged that complete coverage of all breeders was obtained during the 2012 count.

Distribution

In 2012 Great Cormorants were breeding in two districts in the Russian part of the Gulf of Finland. 70 % of the nests were located on islands in the Kingisepp district and the remaining 30 % were breeding in the Vyborg district (Fig. 28.1). When compared to the breeding numbers from 2006, an increase was observed in the Kingisepp district, while a decrease in the number of nests was seen in the Vyborg district.



Figure 28.1. Distribution and size of breeding colonies of Great Cormorants in the Russian part of the Gulf of Finland in 2012. The region in blue denotes the areas covered by the count in this region.

In the Kingisepp district, located in the southern part of the Gulf of Finland, 3,225 nests were counted in three colonies. The largest colony contained six sub-colonies (defined as less than 2 km apart) and was located on the western part of the Seskar archipelago, which lies 19 km north of the southern coast of the Gulf of Finland. In this colony, Great Cormorants built nests on small islands ranging in size from 0.1 to 1 ha and the colony had 38 % of the total population (1,733 nests). The remaining breeders in this district were found on Reimosar Island and the small islands of Severny Virgin. Reimosar Island is located 2 km from the west coast of the Kurgalsky peninsula and had 1,306 nests (28 % of the breeding population). The Severny Virgin islands located in the middle of the bay held 186 nests, 4 % of the national population.

In the northern district of Vyborg, the remaining 30 % of breeders (1,380 nests) were found in four separate colonies located on islands off the northern coast of the Gulf. The majority of the breeders in this district (79 % 1,088 nests) were located in one colony within the Bolshoy Fiskar archipelago, which is approximately 8 km south of the northern coast of the Gulf of Finland. In the archipelago, Great Cormorants bred in five sub-colonies on islands located within 2 km of each other. The remaining breeders were found

in three colonies located at Dolgy Rif (241 nests), Soglasny (50 nests) and Rondo (1 nest).

Colony size

In 2012, the Great Cormorant population in the Russian part of the Gulf of Finland bred in seven colonies. The three largest colonies contained over 1,000 nests each, with the largest single colony containing 1,733 nests. These three colonies contained 90 % of the breeding Great Cormorant population in 2012 (4,127 nests). Of the remaining breeders, 9 % (427 nests) were found in two colonies holding between 100 and 500 nests and 1 % (51 nests) were found in two small colonies containing less than 100 nests (Fig. 28.2 and 28.3).

All breeding colonies of Great Cormorants in the region were located on uninhabited islands with no trees. All nests were located on the ground either on or between rocks or small areas with reeds, at a distance of 5 to 25 m from the water. The islands where Great Cormorants built their nests are situated in zones with strict border controls, so the number of visitors and human disturbance is limited. Colonies located on the northern shore of the Gulf build their nests using twigs and reeds. In the colonies near the south coast nests are built entirely of reeds.







Figure 28.3. Distribution of the Great Cormorant breeding population in relation to colony size in the Russian part of the Gulf of Finland in 2012.

Human intervention in colonies and other factors

In 2012, as in previous years, no actions were carried out to control Great Cormorant breeding numbers in colonies in the Russian Gulf of Finland. A significant reduction in the number of nests in colonies was observed on the islands located close to the coast of the Gulf, where ground predators are present (fox and raccoon dog). Evidence of predation and large scale destruction of nests in colonies was recorded in colonies on the Dolgy Rif, Rondo and Kurov island (part of the Seskar archipelago).

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Great Cormorant colony at Dolgy Rif, June 2012. Photo: Anna Gaginskaya.

29 Status of the breeding population of Great Cormorants in the Kaliningrad region in Russia in 2012

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National summary

In 2012 there were 9,535 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in two colonies in the Kaliningrad region in Russia. The population has been growing steadily after the founding of the first Great Cormorant colony in the region in 1985. Since 2005 the number of Great Cormorants breeding in the region has increased by 1,035 pairs (ca. 12 %).

Colony distribution and size

The first reports of Great Cormorants breeding in the Kaliningrad region are from 1985 when 30 nests were found in a colony on the south-eastern coast of the Curonian Lagoon, at the estuary of the Deyma River in the Polessk district. During the late 1980s and 1990s this colony grew in size with numbers reaching 1,100 nests by 1997. This rapid expansion in breeders continued and by 2001 there were more than 5,000 nests in the colony, which increased to 8,500 nests in 2005. A second colony on the south-western shore of the lagoon was founded in 1995 when 15 nests were reported. However, over the following years the nests were destroyed and the colony ceased to exist. Breeding began again at this location in 2008.

In 2012 all Great Cormorants breeding in the Kaliningrad region were found in two colonies located on the southern shores of the Curonian Lagoon (Fig. 29.1). The larger of the two colonies was located at the estuary of the Deyma River (original founding colony). This colony contained 9,075 nests in 2012, representing 95 % of the total number of nests in the region. The second smaller colony was located on the south-west coast of the Curonian Lagoon and contained 460 nests, 5 % of the breeding population. In the Kaliningrad region Great Cormorants built nests exclusively in trees, mainly in wet Black Alder forests (*Alnus glutinosa*). Great Cormorants were also reported sporadically nesting on willow (*Salix sp.*) and Silver Birch (*Betula pendula*).



Figure 29.1. Regional distribution of the breeding population of Great Cormorants in Kaliningrad region in 2012.

Human intervention in colonies and other factors

In the areas surrounding the breeding colonies the main types of land use are wood exploitation and recreation. Locals consider the Great Cormorant as an object of trade, and the bird is commonly used as a food item. Colonies are often visited by poachers, fishermen and tourists, but no actions were taken in 2012 which directly affected the breeding birds. The waters adjacent to the Curonian lagoon are used for transport (boats, ferries etc.).

During the 2006 Great Cormorant census it was reported that conflicts existed between breeding Great 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.



Great Cormorant colony on the south-west coast of the Curonian Lagoon, Kaliningrad, Russia. June 2012. Photo: Christina Chaika.

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30 Status of the breeding population of Great Cormorants in Kandalaksha Bay (White Sea) in Russia in 2012 and 2013

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National Summary

For 2012 it was estimated that there were a total of ca. 100 breeding pairs of Great Cormorants (*Phalacrocorax carbo carbo*) in three colonies located on islands in Kandalaksha Bay (60 nests counted). Breeding took place on Gagarkina Island, Dresnoy Baklysh Island (located 7 km apart) and Malaya Gulmakha Island, located 15 km further north. In the 2013 breeding count, 58 nests were recorded on two of the islands; no breeding took place on Gagarkina Island due to extensive predation by White-tailed Eagles (*Haliaeetus albicilla*). Since the year 2000 Great Cormorant breeding numbers in the Kandalaksha Bay appear to be stable (ca. 100 nests). During the 2012 and 2013 breeding counts all islands within the Nature Reserve territory in Kandalaksha Bay were surveyed.



Great Cormorant colony on Malaya Gulmakha in Kandalaksha Bay, July 2013. Photo: I. A. Kharitonova.
Distribution and colony size

Great Cormorants have been breeding in Kandalaksha Bay since the 1960s. The first breeding pairs were discovered on Srednyaya Luda Island in 1967 (Bianki et al. 1997). Seven breeding pairs were discovered in 1967 and in the early years after colonization the colony was the main breeding colony, located on the south western coast of Kandalaksha Bay (Karelian coast), around 90 km south east of the city of Kandalaksha. By the early 1990s around 130 pairs were breeding at this location, but in the early 2000s the colony disappeared. Between 2000 and 2005 irregular breeding was reported on small rocky islands at the head of Kandalaksha Bay with groups of up to 15 pairs. These small colonies were present only for a few years.

In 2012 Great Cormorants bred on three islands in Kandalaksha Bay, with the majority of nests built on the ground on bare rocky islands within ca. 5 km from the Karelian Coast. Colony counts were conducted from small ships or motor boats. Photographs of the colonies were taken and used to accurately determine the number of nests.

The most northern Great Cormorant breeding colony was located on Malaya Gulmakha Island, ca. 18 km south-east of Kandalaksha and 5 km from the Karelian Coast. The colony had 15 nests in 2012, which increased to 41 nests in 2013. Breeding numbers appear to be increasing on the island as no breeding was reported in 2010 and 3 nests were reported in 2011.

The largest Great Cormorant colony in the region in 2012 was located 15 km further south on Dresnoy Baklysh Island. The colony had 26 nests and this was the first year that breeding was reported on the island which has an area of 0.3 ha. A lighthouse is located on the island and the majority of the breeding birds built their nests on top of the lighthouse with some nests found at the base. In 2013 the number of breeders in this colony dropped to 17 breeding pairs.

The most southern colony in 2012 was located on Gagarkina Island, with an area of 2.2 ha. The island is located ca. 7 km south of Dresnoy Baklysh Island, and ca. 40 km south east of Kandalaksha. The Gagarkina Island colony contained 19 nests in 2012. The number of Great Cormorants breeding in this colony has decreased noticeably since 2010 when 170 nests were reported. In 2013 no breeding took place at this location, apparently because of extensive predation from White-tailed Eagles.

Human intervention in colonies and other factors affecting

The breeding sites are situated within the boundaries of the Kandalaksha State Nature Reserve and there is no or only little human impact on the colonies. It is prohibited to visit islands with Great Cormorant colonies during the breeding season, i.e. until the birds leave the colonies.

The main factor currently affecting the success of the Great Cormorant colonies is the predation by White-tailed Eagles. In 2010 all 170 Great Cormorant nests in the Gagarkina Island colony were destroyed by eagles. During a colony visit in July 2012 seven White-tailed Eagles were reported in the Great Cormorant colony and White-tailed Eagle pellets with the remains of juvenile Great Cormorants were found in the nests. In 2011 and 2012 all nests in this colony were destroyed by White-tailed Eagles. Predation also occurs in the Dresnoy Baklysh Island colony. While surveying the colony in



Great Cormorant colony destroyed by White-tailed Eagles on Gagarkins Island, July 2010. Photo: A.G. Egorov.

August 2012 a White-tailed Eagle was observed flying away from the colony. The nests at the base of the lighthouse were destroyed and only those at the top of the lighthouse remained intact.

Herring Gulls (*Larus argentatus*) and Great Black-backed Gulls (*Larus marinus*) also predate on Great Cormorant nests in Kandalaksha Bay along with Raven (*Corvus corax*) and Hooded Crow (*Corvus c. cornix*) to a lesser extent.

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A Great Cormorant colony at Dresnoy Baklysh Island in Kandalaksha Bay, June 2012. Nests are located at the lighthouse and on the ground. Photo: A. Bergard.

31 Status of the breeding population of Great Cormorants in the Krasnodar region in Russia in 2012

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National Summary

In 2012 there was an estimated 18,000 to 20,000 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in the Krasnodar region in Russia (16,928 nests counted). A total of 17-19 colonies were estimated to exist (17 counted) which were located in the Eastern Sea of Azov coast ('Pryazovie') and on the Taman peninsula. The number of Great Cormorants breeding in the areas has increased since 2007/2008 when the population was estimated at 15,000-18,000 pairs (Lokhman et al. 2008a, 2008b, Lokhman et al. 2010). It is judged that complete coverage of all breeders in the region was obtained during the 2012 count.

Distribution

The Great Cormorant is the most numerous representative of the copepod class (*Pelecaniformes*) in the south of European Russia. Up until the 1980s Great Cormorants were restricted to Kuban River Delta, in the Primorsko-Akhtarsk and Talgirsky estuaries and breeding numbers didn't exceed 2,000 pairs. Since the 1980s Great Cormorants have expanded their breeding areas to the north and south.

After the 1980s Great Cormorants began breeding at Kiziltash estuary and Lake Khansky. Since the beginning of the 21st century the breeding population has consisted of several small groups which are located in the Kuban River Delta (the esturaries, also known as limans: Maly Kirpiyevsky, Vostochny, Gorky, Mechetny, Bolshoy Kuschevaty, Gruschany), on Lake Hansky as well as on Yeisk and Kiziltashsky estuary. In 2010 a redistribution of Great Cormorants was observed within the Azov and Black Sea regions (and the Krasnodar region). The once prospering colony of Great Cormorants on Lake Hansky began to decline in numbers after the water levels in the reservoir dropped. At the same time the number of breeding birds increased on the islands in the Yeisk estuary and new small colonies emerged in the Kuban River Delta (Fig. 31.1). By 2012 Yeisk estuary became one of the most important Great Cormorant breeding sites in the Krasnodar region.



Figure 31.1. Distribution and size of breeding colonies of Great Cormorants in the Krasnodar region in Russia in 2012. The blue area denotes the area covered by the counts carried out in the Krasnodar region.



Kuban River estuary Yeisk estuary Kiziltashsky estuary Lake Hansky Other reservoirs **Figure 31.2.** Historical distribution of the Great Cormorants breeding population in the Krasnodar region in Russia from 1950 to 2012. Estimated breeding numbers are up to 2,000 pairs for 1950-1979, up to 10,000 pairs for 1980-1999, up to 17,000 pairs for 2000-2008 and up to 20,000 pairs for 2012. Source: Lokhman et al. 2008b. In 2012 the major colonies of Great Cormorants were located on the islands of Yeisk and Kiziltashsky esturaries and on Lake Hansky (Fig. 31.3). In these three locations 85 % of all nests in the Krasnodar region were located. Colonies were mainly built on the shell-sandy islands (79 %) where Great Cormorants build their nests on the substratum.





Colony size

In 2012 it is estimated that Great Cormorants were breeding in 17-19 colonies in the north-western Krasnodar region (17 counted). Colony size ranged from 10 to 6,700 nests. The largest colony was located in Yeisk estuary on the island of Yeisk Spit (6,700 nests). Another large colony of 2,543 nests was located on the same water body, 10 km from Yeisk Spit on the Green Islands. Over half (54 %) of the breeding population of Great Cormorants in the Krasnodar region were located in the Yeisk estuary in 2012. The smallest colonies containing between 1 and 100 nests were located mainly in the Kuban River Delta.

Overall, the majority of colonies surveyed in the region were small, containing between 1 and 250 nests (11 colonies) (Fig. 31.4). These small colonies had only 6 % of the breeding population (Fig. 31.5). Two intermediate sized colonies contained between 501 and 1,000 nests and contained 9 % of the population. Of the remaining four large colonies, two contained between 1,001 and 3,000 nests, housing over one quarter of all breeders (26 %). The two largest colonies contained between 3,001 and 7000 nests and had more than half of the population (59 %).



Figure 31.4. Size distribution of Great Cormorants in the Krasnodar region in Russia in 2012.



Figure 31.5. Distribution of the Great Cormorant breeding population in relation to colony size in the Krasnodar region in Russia in 2012.

In the Krasnodar region the majority of Great Cormorants nested on islands (79 %; Lokhman 2012) with the remaining breeders found on floating bogs, in trees and on concrete constructions. The majority of breeders in the region (75 %) built their nests on the ground, while 25 % built nests in trees. Among the ground nesting birds, nests were found on islands (87 %) with the remaining nests situated in floating bogs (13 %). Among the tree nesting population, nests were located on islands (54 %), floating bogs (38 %) and on the mainland (38 %). In recent years it has been observed that the number of birds nesting in trees has increased.

Human actions in colonies and other factors

Almost all Great Cormorant colonies in the Krasnodar region are affected by human actions to a varying degree. In the Kuban River Delta the anthropogenic influence is constant due to the large number of motor boats which use the area with no restrictions or limitations. In colonies located on the Kiziltashsky estuary local people remove eggs from Great Cormorants nests. At fish farms management actions are taken to regulate the Great Cormorant population. Currently the Great Cormorants is included on the list of birds which can be hunted. In response to predators, Great Cormorants began to nest at the periphery of deep reservoirs or among reed beds in the trees. In these conditions the nests are protected from predators including wild boar (*Sus scrofa*), raccoon dog (*Nyctereutes procyonoides*) and raccoon (*Procyon lotor*).

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Nests and large chicks of Great Cormorants on the floating bog of water vegetation in the Kuban River delta. Photo: Yury Lokhman, The Kuban Scientific-Research Centre "The Caucasus Wild Nature".

32 Status of the breeding population of Great Cormorants in Onega Bay (White Sea) in Russia in 2013

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National summary

In 2013 it is estimated that there were 50 breeding pairs of Great Cormorants (*Phalacrocorax carbo carbo*) in four colonies in the Onega Bay of the White Sea. Between 2007 and 2013 all known Great Cormorant colonies in the region were visited and surveyed (see Table 32.1). The population of breeding Great Cormorants has been in decline from 2007 to 2013. Interviews carried out in 2013 with tourists and local residents revealed that no Great Cormorant colonies were known to exist on the Parusnitsy Archipelago. However a small number of birds (about 10 pairs in each colony) were breeding on two or three other islands (in one case it is not clear if the respondents mean one and the same island or two different islands) in the central part of the Onega Bay. Thus in 2013 the total number of breeding Great Cormorants in the Onega Bay is estimated 50 pairs in four colonies.

Distribution

Great Cormorants were first reported breeding in Onega Bay in the 1980s on the Salma-Ludy Islands (Cherenkov et al. 2011). Due to the size of the region and distribution of breeders, regular monitoring is not possible and annual population trends are difficult to determine. In two colonies regular counts have been carried out since the late 1980s (Malaya Sennukha and Krasivyi Islands) and detailed information is available. By the end of the 1990s Great Cormorants had expanded their breeding area and it was estimated there were 400 pairs breeding in the Onega Bay (Cherenkov et al. 2011). By 2006 breeding numbers had declined to 198 pairs and it appears this decline has continued up to 2013. Cormorants breeding on Churnavolok Island, White Sea, Russia, July 2013. Photo: Yurii Gendlin.



 Table 32.1. Great Cormorant nest numbers in Onega Bay (White Sea) in Russia from 2007 to 2013.

Colony (Island)	2007	2008	2009	2010	2011	2012	2013
Morzhenets	90	?	?	0	?	?	?
Malaya Parusnitsa	?	57	?	?	?	?	?
Bolshaya Parusnitsa	0	0	?	0	?	?	?
Great Cormorant's rock	?	0	?	?	?	?	?
Malaya Sennukha	53	0	0	0	0	0	0
Krasivyi	0	27	0	0	0	0	0
Bolshoi Berezovyi	0	0	38	20	20	0	0
Churnavolok	9	?	?	?	?	39	26

Human intervention in colonies and other factors

Most of the Great Cormorant colonies in the Onega Bay are not permanently occupied. In 2004 Great Cormorants first began breeding on the Solovetski Archipelago (Krasivyi Island), but in 2006 the colony was disturbed and the birds migrated to Malaya Sennukha Island (Cherenkov et al. 2011). In 2009 Great Cormorants again began breeding on the Solovetski Archipelago on Bolshoi Berezovyi Island (not far from the previous colony), but in 2011 the colony was also disturbed early in the season. Consequently, some of the birds moved to the Malaya Sennukha Island later in the season, but all the nests on that island were also disturbed.

The cause of the decline in breeding numbers between 2007 and 2013 is not clear. It may be that the increase in disturbance by tourists and fishermen on the islands has played a role.

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33 Status of the breeding population of Great Cormorants in the Volga Delta in Russia in 2012

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National Summary

In 2012 there were 28,123 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 11 colonies in the lower reaches of the River Volga Delta in Russia. In 2012 the Astrakhan Nature Reserve surveyed 22 locations in the delta during a count of colonial waterbirds. The colonies were surveyed from the air and the ground and the Great Cormorant was the most numerous colonial breeder reported during the survey. It is judged that all Great Cormorant colonies in the Volga Delta were covered during the survey.

Distribution

The Volga Delta is one of the largest deltas in Europe covering an area of over 27,000 km². It is located on the north-western shore of the Caspian Sea. Russia's second nature reserve was established here in 1919 (Astrakhan National Reserve) and in 1976 the area was included in the Ramsar list. In 2012 a total of 11 Great Cormorant colonies were located in the pre-estuarial zone of the Volga Delta (Fig. 33.1) (Rusanov et al. 2012). Colony counts were carried out using aerial surveying and photography, by boat and through ground based surveys. The aerial survey was carried out on the 29th of May 2012. The aeroplane flew at an altitude of 150 m, with a speed of 160 km for three hours 30 minutes. The aerial survey focused on large remote areas which are inaccessible and unsuitable for ground surveying. Due to the complexity and expanse of the delta area, it was difficult at times to locate colonies. Ground surveys were carried out in late May and early June in colonies where this was suitable.



Figure 33.1. Distribution and size of Great Cormorant breeding colonies in the Volga Delta in Russia in 2012. The area covered by this survey includes only the outermost part of the delta (for details, see Rusanov et al. 2012).

In 2012, the Great Cormorant population in the Volga Delta bred in 11 colonies. The two largest colonies contained 12,000 and 5,000 Great Cormorant nests, respectively. Over half of the breeders were located in the Volodarsky District in five colonies (14,300 nests; 51 %). Three colonies were located in the Kamyzyaksky District (5,023 nests; 18 %), two colonies in the Liman District (5,800 nests; 21 %) and one colony in the Ikryaninsky District (3,000 nests; 11 %).

Colony size

In 2012 the largest colony in the Volga Delta was located at "Stone" (Каменная) in the north-eastern Volodarsky District (Obzhorovskiy area of Astrakhan reserve), and contained 12,000 nests (43 % of the breeders counted in the Volga Delta). This colony was established in 1963 and has been regularly surveyed by ornithologists since 1968.

The second largest Great Cormorant colony in the Volga Delta contained 5,000 nests and was located in the south-western Liman District. In 2012 60 % of all Great Cormorants surveyed were located in the two largest colonies (Fig. 33.2 and 33.3). Six Great Cormorant colonies contained between 1,001 and 3,000 nests in 2012 (Fig. 33.2) and held in total 25 % of the breeding

population (Fig. 33.3). The remaining three smaller colonies contained between 1 and 1,000 nests, and these colonies had 15 % of the breeders.

The majority of Great Cormorant colonies in the Volga Delta were single species colonies. Four of the 11 colonies were mixed, where Great Cormorants bred alongside Grey Heron (*Ardea cinerea*), Night Heron (*Nycticorax nycticorax*), Great Egret (*Casmerodius albus*) and Little Egret (*Egretta garzetta*). In the Volga Delta Great Cormorants built nests in reed beds and on trees, mainly White Willow (*Salix alba*).

3001-12000 nests



Colony size (number of nests)





15%

1-1000 nests

Figure 33.3. Distribution of the Great Cormorant breeding population in relation to colony size in in the Volga Delta in Russia in 2012.

Human intervention in colonies and other factors

Half of the waterbird colonies (11 out of 22) surveyed in the Volga Delta were located in protected areas (nature reserves, buffer zones and sanctuaries). Furthermore, in the two Great Cormorant colonies in the Liman District, there is limited access due to border restrictions, customs and commercial fisheries. Despite the protections and restrictions, colonial nesting species (including Great Cormorants) have relocated to areas which are inaccessible to people as a result of increasing human presence in the Volga Delta (fishermen, tourists, photographers, naturalists, geophysists etc.).

Loss of suitable nesting habitat is a major threat facing Great Cormorants breeding in the Volga Delta. Forest fires and increasing water levels in the Caspian Sea are two major factors causing habitat loss. Aerial surveys carried out in 2012 revealed the extent of damage caused by fires (in forests and reed beds) in the Volga Delta during the spring of 2012. The fires in 2012 were exceptional as they affected both the land and water areas of the lower delta zone. Evidence of fires was observed in the lower zone of the delta starting from the Kazakhstan border in the north east continuing almost uninterrupted to the Volga-Caspian Canal and the north-west coast. Fires affected areas of the Astrakhan Biosphere Reserve also, and in some cases the forests were badly damaged. Additionally, a number of Great Cormorant colonies are regularly affected by the changing water levels in the Caspian Sea. Forests and other vegetation (including reed beds) become waterlogged and suitable nesting habitats are lost.

Management actions were carried out in one Great Cormorant colony in 2012, located close to a commercial fishery operation in the Liman District. In this colony, juvenile Great Cormorants were shot in an attempt to control population numbers in 2012.

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Aerial view of Great Cormorant colony in the Volga Delta in the northeastern part of the Caspian sea. Photo: G. Rusanov.

34 Status of the breeding population of Great Cormorants in Serbia in 2012

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National summary

In 2012, Serbia had an estimated 2,000 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 20 colonies (1,871-1,981 nests counted in 16 colonies). This is an increase of approximately 1,300 pairs compared to breeding records from 1998 when there were 700-760 breeding pairs (Puzović et al. 1999). The 2012 count was the most complete census of breeding Great Cormorants carried out in Serbia within the last 20 years or more. It is believed that almost complete coverage of the breeding population was obtained. All known Great Cormorant breeding sites were visited and three new colonies were discovered during the 2012 count. A small possible breeding colony was located during a subsequent winter roost count carried out in January 2013. Thus three nests were discovered at a large roosting site, but it was not possible to determine if breeding had taken place at this site in 2012.

Distribution

Colonies were found across the country, but all larger colonies were located along the river Danube which crosses the northern part of Serbia (Fig. 34.1). Over three quarters of Great Cormorants in Serbia were breeding on islands on the River Danube and flooded forests along the river banks. A further 15 % of all breeders were nesting in the Banat region in north-eastern Serbia. Together these two regions had the majority of the national breeding population (Fig. 33.2), with less than 10 % of breeders found elsewhere in the country. Great Cormorants were found nesting on a slightly unusual site in one colony - a large electrical pylon which is situated on the River Danube.



Figure 34.1. Distribution and size of breeding colonies of Great Cormorants in Serbia in 2012.



Colony size

In 2012 breeding Great Cormorants were found in 16 colonies. The largest colony, located on Smederevo River Island on the River Danube, had approximately 350 nests. Overall, there were seven colonies which contained more than 100 nests (Fig. 34.3). Almost 85 % of the national breeding population was found in these seven colonies (Fig. 34.4). Of the remaining nine colonies, three contained between 51 and 100 breeding pairs (medium sized) and six contained less than 50 nests or less (small sized). The medium sized colonies contained less than 15 % of the national breeders, and the small colonies had the remaining 5 %.





Figure 34.3. Size distribution of Great Cormorant colonies in Serbia in 2012.

Figure 34.4. Distribution of the Great Cormorant breeding population in relation to colony size in Serbia in 2012.

Human intervention in colonies and other factors

There was no organized management in Great Cormorant breeding colonies in Serbia in 2012. In one colony located on a large electrical pylon near the hydro dam 'Derdap I', nests are destroyed every year. A total of six Great Cormorant colonies (containing 47 % of the population) are located inside protected areas, while the remaining colonies (53 % of breeders) are at risk of human interference by fishermen and poachers.

In eight colonies (ada Čakljanac, Šašićeva ada, Ivanovska ada, Carska bara, Bečej fish pond, Palić lake, Djerdap, Baranda - Tamiš) carp fish ponds are located within a 30 km distance from the breeding colony, and it is believed that the breeding Great Cormorants in these colonies partially forage at these sites. These eight colonies had 43 % of the national breeding population in 2012, but only three colonies (Carska bara, Bečej fish pond and Baranda - Tamiš - 16 % of the population) were considered to be directly depending on foraging in the fish pond areas (these colonies had access to aquaculture areas within a distance of less than 10 km). This may suggest that Great Cormorants breeding in Serbia have a rather limited impact on the carp fish ponds.

Over the past two decades the Great Cormorant breeding population has been increasing. This is probably due to a ban on hunting, but maybe also because an increasing number of wintering birds (from the Baltic Sea countries) stay in the wintering area and start breeding. A recent change in legislation in 2012 now permits the culling of Great Cormorants if permission is obtained from the Ministry for Agriculture, Forestry and Waterpower Engineering and the Institute for Nature Protection. This may have a considerable negative effect on the development of the breeding population in the future.

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35 Status of the breeding population of Great Cormorants in Slovakia in 2012

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National summary

The breeding population of Great Cormorants (*Phalacrocorax carbo sinensis*) in Slovakia consisted of 99 breeding pairs in two colonies in 2012. The number of Great Cormorants breeding in Slovakia has been declining since 1995. It is believed that complete coverage of all known breeders was obtained during the 2012 census.

Distribution and colony size

Great Cormorants bred in two colonies in Slovakia in 2012 (Fig 35.1). The larger colony contained 93 nests and was located on an island (Močiansky Ostrov) on the Slovak side of the River Danube in the south-western region of Nitra. The second smaller colony contained 6 nests in 2012 and was located in the eastern region of Koŝice at the Senné Fish Ponds.

The colony at Močiansky Ostrov is located in the Dunajské Luhy (Danuabe floodplains) Special Protection Area (SPA). According to the law, this area has strict protection, but in reality these rules are not applied. This colony is located close to the village of Moča between the towns of Komárno and Štúrovo on an island in the middle of the river. The island is 500 m long and 60 m wide. In 2012 Great Cormorants were breeding on poplar trees (*Populus* sp.) in a mixed colony together with Grey Heron (*Ardea cinerea*), Night Heron (*Nycticorax nycticorax*), Little Egret (*Egretta garzetta*) and Rook (*Corvus frugilegus*).

The second smaller colony in eastern Slovakia was also located in an SPA (Senianske Rybníky). Despite the fact that access to the area is prohibited by law, intense harassment of breeding Great Cormorants takes place. Breeding took place on poplar trees (*Populus* sp). on islands at the fish ponds.



Figure 35.1. Distribution and size of breeding colonies of Great Cormorants in Slovakia in 2012.

Historical development

The present breeding population of Great Cormorants in Slovakia is only a small remnant of a previously larger population. Up until the late 1960s Great Cormorants bred in a number of large colonies on the Slovak side of the river Danube. The most famous colony was located near Bratislava on Ostrov Kormoránov (which translates to Cormorant Island), which contained around 800 nests in 1950-51. The colony on Ostrov Kormoránov was abandoned in 1962 after permission was granted for unregulated shooting during the breeding season (Kalivodová & Darolová 1998). The island no longer exists following the creation of the Gabčíkovo Water Reservoir in 1992.

After the destruction of the colony at Cormorant Island in 1962, Great Cormorants were rare in the Danube lowlands and it is believed that by 1966 the Great Cormorant had disappeared as a breeding bird in Slovakia. In the years between 1967 and 1978 Great Cormorants were a rare sight during the breeding season. In subsequent years the number of Great Cormorants overwintering in Slovakia began to increase and new colonies were founded downstream on both the Slovak and Hungarian sides of the river. One of these colonies was founded on the Slovak side on Močiansky Ostrov in 1979 (Sághy & Štollmann 1992). Great Cormorants continued to breed at this location in 2012.

For many years the Danube lowland area was the only region in Slovakia with breeding Great Cormorants. During the 1980s several smaller colonies were founded along river Morava near the border between Austria and the Czech Republic (also in neighbouring countries) (Danko & Darolová 2002). One colony was located on the Slovak side of the Morava River and relocated regularly until 2003. In 2003 the Great Cormorants relocated to the Austrian side of the river, when the tree which contained the nests fell.

As late as 1990 a new colony was founded in eastern Slovakia at Senné (Iňačovské) Fish Ponds in the Senné National Nature Reserve (Danko 1997, 1998). This colony was still active in 2012. A further two Great Cormorant colonies were founded after 2000, which were not active in 2012. The first colony was located at a reservoir at Liptovská Mara in northern Slovakia, but this colony was abandoned within a year due to intensive harassment. The second colony was located at Zemplínska Šírava Reservoir in eastern Slovakia, which was also abandoned after a short period due to harassment.

The two colonies that where active in 2012 developed as follows. After the founding of the Močiansky Ostrov colony in 1979 breeding was irregular in the early years and numbers remained low (3-4 nests). Breeding numbers increased slowly over the following years, but did not exceed 40 nests between 1979 and 1995 (Bohuš 1994, Musil et al. 1997). In 1996 there were between 50 and 80 nests in the colony (Musil et al. 1997) and the population reached 110 nests by 2003. Between 2004 and 2012 breeding numbers remained relatively stable, ranging from 85 to 125 nests (93 nests in 2012) (Gúgh 2008). In 2012 similar numbers of breeders were recorded in the colonies on the Hungarian side of the Danube near the villages of Sap, Vojka and Veľké Kosihy, with smaller numbers at the colony near Chľaba village.

Great Cormorants began breeding at Senné Fish Ponds (in the eastern region of Koŝice) in 1990 when approximately 20 pairs established nests. Numbers increased to 120 nests in 1991 and a peak was reached in 1995, with 220 nests. Management actions which began after 1995 have resulted in a steep decline in numbers. As a result, in 2004 no Great Cormorants bred at this site and between 2004 and 2007 there were between 8 and 28 nests (Danko 2011).

Human intervention in colonies and other factors

No serious conflicts have been registered between breeding Great Cormorants and fisheries on the river Danube. Great Cormorants breeding on the river Danube are positively perceived by both members of the public and fisheries and are accepted as a native part of the Danube ecosystem. As a result no management activities are carried out in breeding colonies along the river. However, tourists pose a more serious threat to Great Cormorants breeding in this area. According to the law, the breeding island is protected as part of an SPA, but many tourists visit the island and disturb the breeding Great Cormorants.

More serious conflicts exist in eastern Slovakia. From the beginning, the breeding of Great Cormorants at the fish ponds in Senianske Rybníky SPA was a sensitive issue. Management actions both legal (through permits issued by the Ministry of the Environment) and illegal began after breeding numbers reached a peak in this colony in 1995 (220 nests). Actions included

shooting of birds and tree felling. In response to tree felling, which ended in 1999, Great Cormorants began breeding on the ground and overall numbers decreased to only 40 nests in the Senianske Rybníky SPA in the following years (Danko 2011). However management actions continued until 2003 and included shooting of Great Cormorants, which has led to the current situation, with only six breeding pairs remaining at this location in 2012. Illegal actions also take place in this colony, similar to actions reported at the abandoned colony at Liptovská Mara Reservoir. Actions include nest destruction and shooting of adult Great Cormorants during the breeding season.

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A breeding colony of Great Cormorants and Rooks at Močiansky ostrov, Slovakia, May 2013. Photo: Ján Gúgh.

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36 Status of the breeding population of Great Cormorants in Spain in 2012

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National summary

In 2012 SEO/BirdLife carried out the census in Spain and had 1,605 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 21 colonies. This is more than a threefold increase since the last national count of breeders in 2007 (532 pairs). A total of 239 sites were visited during the 2012 count and the focus was on reservoirs, dams, reed beds and rivers. It is believed that complete coverage of all breeders was obtained during the 2012 breeding counts.

Distribution

Great Cormorants bred primarily in central and western Spain (Fig. 36.1) across 12 different regions. Almost three quarters (70 %) of the breeding population was located in two regions. The western province of Badajoz was home to 41 % of the population (651 nests, four colonies). A further 29 % of the population (468 nests, four colonies) was located in the central province of Toledo. The remaining 30 % was distributed across 10 different regions (Fig. 36.2). Great Cormorants breed almost exclusively in trees in Spain with only one small colony (7 nests) reported breeding in reed beds.

Colony size

Spain had 21 breeding colonies of Great Cormorants in 2012. The majority of the colonies had a small number of nests (Fig. 36.3), while on the other hand the two largest colonies contained 63 % of the population (1,014 nests, Fig. 36.4). The largest colonies were located on the La Serena reservoir in the Badajoz region (614 nests), and on the Rosarito reservoir in the Toledo region (400 nests). Of the remaining 19 colonies, two had 100-200 nests, two contained 50-100 nests and the remaining 15 had fewer than 50 nests (Fig. 36.3).



Figure 36.1. Distribution and size of breeding colonies of Great Cormorants in Spain, 2012. Source: SEO/Bird Life.







Figure 36.3. Size distribution of Great Cormorant colonies in Spain in 2012. Source: SEO/BirdLife.

Figure 36.4. Distribution of the Great Cormorant breeding population in relation to colony size in Spain in 2012. Source: SEO/BirdLife.

Human intervention in colonies

No management of Great Cormorant breeding colonies was carried out in Spain in 2012.

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A breeding colony of Great Cormorants at La Serena reservoir, Extremadura, Spain, May 2012. Photo: Ángel Sánchez.

37 Status of the breeding population of Great Cormorants in Sweden in 2012

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National summary

The breeding population of Great Cormorants (*Phalacrocorax carbo sinensis*) in Sweden was estimated at 40,598 breeding pairs in 2012, distributed across 169 colonies (Fig. 37.1). The population appeared to reach a maximum around 2006 when a total of 43,706 pairs were recorded. Results from the 2012 count show a decrease of 7 % compared to the last complete count in 2006. The 2012 breeding count obtained a high level of coverage. However, for 20 colonies results from counts in recent years were used as a count was not carried out in 2012. On a national level Great Cormorants are not monitored annually, but in a number of counties annual surveys are organized.

Population distribution and development

Great Cormorants re-established a breeding population in Sweden in the late 1940s after being absent for more than half a century. Since then, the main breeding area has been the shallow coastal areas of the southern Baltic Sea. In 2012 the Baltic Sea had 62 % (ca. 24,500 nests) of the breeding population (Fig. 37.2). The Bothnian Bay, in the far north, held 10 % of the population (ca. 4,000 nests). The south coast was home to 4 % of the breeders (ca. 1,700 nests) and the west coast had 7 % (ca. 3,000 nests). The remaining 18 % of breeders were found on inland lakes (ca. 7,300 nests).

The development of the breeding population of Great Cormorants has varied in the different regions over the last decade. During the period from 2006 to 2012, the Great Cormorant population has increased along the west coast (7 %) and the Bothnian Bay (26 %) while it has decreased on the south coast (10 %) and the Baltic Sea coast (6 %). When breeding numbers from the last three years are examined, the population seems to have stabilized on the west coast (9 %) and flattened out in the Bothnian Bay (2 %).



Figure 37.1. Distribution and size of breeding colonies of Great Cormorants in Sweden in 2012. Source: Swedish Environmental Protection Agency.



Number of nests

In 2012, almost one fifth of the breeding Great Cormorants in Sweden (18 %, 7,305 pairs) nested on lakes. Among the lake breeding Great Cormorants 84 % were found in the large lakes Vänern, Vättern, Mälaren, Hjälmaren and Roxen (Fig. 37.3). The proportion of Great Cormorants breeding on lakes has declined by 28 % since 2006. A considerable number of colonies were found on small nutrient poor lakes in southern Sweden in 2012, but those colonies were very small with the majority containing less than 100 nests. The most northerly lake colonies were found at a latitude of around 60° N (Fig. 37.1) and at present the conditions for breeding on lakes above that latitude are not suitable.





Regional distribution

Great Cormorant numbers can be compared on a county/regional level, although these comparisons do not take into account differences in the amount of suitable habitats (areas with water depth less than 20 m), which differs to a large extent between areas. An overview of Great Cormorants breeding in the regions across Sweden is presented in Table 37.1.

The island of Gotland, located in the Baltic Sea off the south-eastern coast of Sweden, was home to approximately 20 % of the breeding population of Great Cormorants in Sweden in 2012. After a rapid increase during the last decade, the population appears to have reached a maximum and is now declining in Gotland. The largest colony in this region, Getorskär, held 1,984 nests in 2012 and was thereby also the largest colony in Sweden.

The second largest regional population is found in the archipelago of Stockholm, which holds approximately 16 % of the Swedish population. The Kalmar region (located on the south eastern coast of Sweden), formerly the main breeding area of Great Cormorants in Sweden, has shown a dramatic decline in breeding numbers to around half since 1999. In 1999, this region contained one third of the national population. In 2012 this figure had declined to 10 % (3,938 nests). The largest colonies in this region are much smaller today; in 1992 they contained up to 3,530 nests.

The Västra Götaland region (located on the south western coast) had a total of 26 colonies (4,490 nests) in 2012, showing a moderate decline in breeding numbers (6%) since the 2006 census. The vast majority of birds in this region were found along the coast (2,815 nests), mainly in the province of Bohuslän. Lake Vänern, which is located in this region, was the lake with the highest number of breeding Great Cormorants in 2012 in Sweden. The Östergötland region, formerly a core area for Great Cormorants in Sweden, had 3,700 nests in 2012. The population is assumed to be fluctuating, although no counts exist from the coastal area in recent years.

Pagion	Necto	Colonico	% Notional Deputation
Region	INESIS	Colonies	
Gotland	8,230	12	20.3 %
Stockholm	6,398	23	15.8 %
Västergötland	4,490	26	11.1 %
Kalmar	3,938	15	9.7 %
Östergötland	3,688	21	9.1 %
Södermanland	2,320	11	5.7 %
Skåne	1,993	9	4.9 %
Västernorrland	1,925	7	4.7 %
Gävleborgs	1,889	3	4.7 %
Blekinge	1,885	3	4.6 %
Örebro	1,120	7	2.8 %
Uppsala	1,097	3	2.7 %
Värmland	576	7	1.4 %
Halland	420	2	1.0 %
Västmanland	230	4	0.6 %
Kronobergs	167	10	0.4 %
Jönköpings	122	4	0.3 %
Västerbotten	110	2	0.3 %
Total	40,598	169	100 %

Table 37.1. Regional (county) distribution of the Great Cormorant breeding population in

 Sweden in 2012. Source: Swedish Environmental Protection Agency.

Great Cormorants build nests in a variety of habitats across Sweden, but no recent data is available on this subject. According to an earlier study, almost half of the population bred in mature trees, while a considerable number built nests directly on bare rock (skerries) or in shrubs (Engström & Pettersson 2003). Almost all colonies are found on small islands and many colonies have been founded on islands where other seabirds were present before Great Cormorants began breeding.

Colony size

In 2012, the Great Cormorant population in Sweden bred in an estimated 169 colonies. The largest colony contained 1,984 nests and was located at Getorskär on the island of Gotland. Almost 20 % of the national breeding population of Great Cormorants was found in the six largest colonies (containing more than 1,000 nests) (Fig. 37.5). Of the remaining 162 colonies, the majority of them (76) were small in size, containing less than 100 nests (Fig. 37.4). The remaining breeders were distributed over colonies of intermediate size.





Figure 37.4. Size distribution of Great Cormorants colonies in Sweden in 2012. Source: Swedish Environmental Protection Agency.

Figure 37.5. Distribution of the Great Cormorant breeding population in relation to colony size in Sweden in 2012. Source: Swedish Environmental Protection Agency.

The median colony size (determined as the middle value when colonies are listed according to size) in a coastal colony was 223 nests in 2012, which is higher than in previous years (Fig. 37.6). In comparison, the median colony size for lake colonies was much smaller (79 nests less) in 2012. A limited number of lake colonies are located close to the coast (within 30 km), allowing only a small number of Great Cormorants to hunt and feed in both freshwater and saltwater. Therefore during the breeding season, the majority of birds which breed on lakes feed exclusively on fish from these lakes. Less productive conditions (i.e. food abundance) in many lakes may be one reason why, on average, Great Cormorant densities and colony size are smaller in freshwater systems than in coastal colonies. In Sweden, the general pattern is that Great Cormorants are not limited by the availability of suitable breeding habitats (i.e. access to small islands). This may partially explain why Great Cormorants are found spread across a large number of colonies throughout the country.





Similar to many other countries, several large colonies in Sweden have declined dramatically in size in recent years, probably due to various factors. For example, the largest recorded colony in Sweden, Svartö in the southern Kalmar Sound, reached its highest number of breeders in 1992 (3,530 nests) but contained only 14 nests in 2012. Some other large colonies in the Kalmar strait region have also decreased considerably in size, or have been abandoned. At a local level this may be due to habitat changes within colonies (i.e. excrement causing trees to die, resulting in a loss of breeding sites) but on a larger scale this is likely due to extensive changes in fish communities. These changes (Ljunggren et al. 2010) have possibly impacted negatively on Great Cormorants, and as a result breeders may have moved to areas with a better food supply. In some cases human disturbance within colonies is the reason behind movements between breeding sites.

Human intervention in colonies

Measures to control Great 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.

In 2009, similar to previous years, 2,970 Great Cormorants were shot in Kalmar county. In Lake Hjälmaren, 1,728 Great Cormorants were shot in 2005, mainly outside the breeding season. The number of Great Cormorants shot on Lake Hjälmaren in this area has been falling steadily in recent years and was down to 622 in 2009. In other areas in Sweden, shooting resulted in the regulation of only a small number of birds, and in some areas shooting is not permitted at all.

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, who also grant permission to individuals/groups wishing to manage Great Cormorant numbers in the various regions. The level of management differs between regions but usually includes both egg control and shooting 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 of management actions.

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Great Cormorant colony at Bergskäret, Stockholm Archipelago, Sweden, 2007. Photo: Henri Engström.

38 Status of the Breeding Population of Great Cormorants in Switzerland in 2012

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National summary

In the summer of 2012, Switzerland had 1,037 breeding pairs of Great Cormorants (*Phalacrocorax carbo sinensis*) in 13 colonies. The overall number of nests has almost doubled since 2010 (560 nests). Great Cormorant numbers have been monitored in Switzerland since the establishment of a breeding population in 2001 (Keller et al. 2012). It is believed that complete coverage of all breeders was obtained in the 2012 colony count, which was carried out by volunteers under the guidance of the Swiss Ornithological Institute.

Distribution

Overall, 1,037 Great Cormorant nests in 13 colonies were recorded in 2012. Most colonies were found in the lowland areas of the Swiss Plateau (Fig. 38.1). One colony was located in southern Switzerland in the low-lying valley of Ticino at the upper end of Lake Maggiore. Great Cormorants were found nesting at three new sites in 2012 (Les Grangettes on Lake Geneva, Lake Sempach and Lake Mauensee, a small lake about three kilometres from Lake Sempach).

Most colonies are situated at lakes, with the largest colonies found at the largest lakes, Lake Neuchâtel, Verbano/Lake Maggiore, Lake Zugersee and Lake Geneva/Léman. All the large colonies are situated in areas with restricted access, six of which are in waterbird reserves of international or national importance. Most colonies are situated on islands or small peninsulas. Colonies on the shore are located in areas with limited public access. In the oldest colony, at the Fanel, Great Cormorants nest on the ground on two artificial islands. In 2011, part of the colony moved to trees on the shore, and in 2012 about 40 % of the nests were constructed in trees. In all the other colonies, nests are constructed in trees, most often poplar (*Populus* sp.), willow (*Salix* sp). and alder (*Alnus* sp).


Figure 38.1. Distribution and size of breeding colonies of Great Cormorants in Switzerland in 2012.

Colony size

The two largest colonies, both situated on Lake Neuchâtel, held over 50 % of the national population in 2012 (637 nests) (Fig. 38.2 and 38.3). Three colonies contained over 50 nests and held over a quarter of the national population (290 nests). All these colonies were situated on large lakes. There were eight small colonies containing 50 or fewer nests.

Human intervention in colonies

There was no human intervention in breeding colonies in 2012.





Figure 38.2. Size distribution of Great Cormorant colonies in Switzerland in 2012.

Figure 38.3. Distribution of the Great Cormorant breeding population in relation to colony size in Switzerland in 2012.



In the waterbird reserve Fanel on Lake Neuchâtel, Switzerland, most Great Cormorants nest on artificial islands, April 2011. Photo: Verena Keller.

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Great Cormorant colony at Champ-Pittet on Lake Neuchâtel, Switzerland, April 2011. Photo: Verena Keller.

39 Status of the breeding population of Great Cormorants in Ukraine in 2012

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National summary

In 2012 the breeding population of Great Cormorants (*Phalacrocorax carbo sinensis*) in Ukraine was estimated at 46,500 breeding pairs (44,597 counted). During the count a total of 69 areas were surveyed across the country and Great Cormorants were breeding at 36 of these locations. It was not possible to survey a small number of locations where breeding took place in previous years (locations in the Danube Delta, Dnieper Delta and northeast and northwest Ukraine). Therefore it is estimated that 96-98 % coverage of all known breeders was obtained during the 2012 count. In 2012 all previously known Great Cormorant breeding sites were surveyed and a number of new breeding areas were also located. The majority of breeding birds were located along the Black and Azov Sea coasts (38,642 nests in 17 colonies; including the Danube Delta). The remaining breeders were found inland (3,897 nests in 15 colonies).



Great Cormorant colony on the Bolshye Kuchugury Islands, Kakhovka Reservoir on Low Dnieper, 2012. Photo: Valeriy Siokhin.

Distribution

During the 2012 count the largest Ukrainian colony, located on Obithochnaya Spit (Azov Sea Coast) with a total of 18,000 nests, was surveyed using aerial photography. Sub-colonies within the large colony were surveyed by helicopter with three ornithologists on board. Firstly the location of each sub-colonies was defined, then photos were taken. By determining the number of tree lines in each sub-colony the area was estimated. In combination with aerial surveys, terrestrial nest counts were carried out on selected tree lines (absolute counts) in different parts of the colony (central and peripheral). Based on this information the total number of nests was estimated.

Colonies were found in different parts of the country, but almost 91 % of breeding birds were located in the south, along or close to the Azov-Black Sea coast (Fig. 39.1). The majority of Great Cormorants breeding in this area (86 %) were breeding in the central part of the Ukrainian Azov-Black Sea coast (Fig. 39.2) between Yagorlytskiy Bay of the Black Sea and Obitochnaya Spit of the Azov Sea. This region attracts breeding Great Cormorants due to the presence of a series of islands in Yugorlytskiy, Tendrovskiy, Dzharylgachskiy and Karkinitskiy bays and the Sivash Lagoon along with long sandy spits along the Azov Sea coast. The majority of islands are quite safe during the breeding season in relation to predators (e.g. foxes) and are rarely visited by fishermen or other people. In the western part of the Azov-Black Sea coast 4 % of the breeding population were found breeding in the Danube Delta (1,758 nests) and the Dniester Delta (170 pairs).

The colonies in the inland areas were located anlong the Dnieper river, next to artificial reservoirs and a few smaller colonies in Westerh Ukraine. In the total the inland colonies had 3897 nests (9 %) in 15 colonies (see Table 39.1).

Around 63 % of all Great Cormorants (21 colonies; 28,035 nests) breeding in Ukraine were nesting on trees while 34 % (12 colonies with 15,082 nests) built nests on the ground and the remaining 3 % were found breeding on manmade structures, including gas platforms, electricity lines etc. Ground nesting colonies were mainly located on islands along the Azov-Black Sea coasts.



The largest Great Cormorant colony in the Western Palearctic with 18,000 nests. It is located on Obitochnaya Spit, the west coast of the Sea of Azov, Ukraine, 2012. Photo: Valeriy Siokhin.



Figure 39.1. Distribution and size of breeding colonies of Great Cormorants in Ukraine in 2012.

In some areas of the Azov-Black Sea coast, during last 40-50 years, foresters have planted pine and other types of forests, which are now suitable locations for breeding. A good example of this is the colonies at Mysovskoe Forestry (5,150 nests in 2012) and Obitochnaya Spit (18,000 and 800 nests in 2012).



Colony size

In 2012 the Great Cormorant population in Ukraine bred in 36 colonies (Table 39.1). In seven of these colonies there were two or more sub-colonies. The largest colony had 18,000 pairs and was located on the Obitochnaya Spit (Kosa Obitochnaya) on the northern shore of the Sea of Azov.

Table 39.1. Results of the Great Cormorant breeding colony census in 2012 in Ukraine. The tables first 21 colonies (down to Krivaya Spit) are located along the coasts of the Black Sea and the Sea of Azov (including the Danube Delta), whereas the following 15 colonies (the Bolshye and Malve Kuchugury Islands etc.) are all inland colonies.

Colony Name	Nests	Sub Colonies	Counters
Danube Delta 2 - Kurilskiy Zhelobok	1,300	1	Yakovlev M.
Danube Delta 4 – Sasykskaya	32	1	Yakovlev M.
Danube Delta 6 - Ermakov Island	426	1	Yakovlev M.
Dniester Delta 4	170	1	Rusev I., Shchegolev I.
Kinburn Peninnsula	40	1	Petrovich Z.
Sokolinye Island	300	1	Petrovich Z.
Bolshoi Konskiy Island	550	1	Moskalenko Yu., Chernyakov D. Plushch S.
Orlov Island	5,178	1	Moskalenko Yu., Chernyakov D. Plushch S.
Karzhynskie Islands	1,000	2	Siokhin V., Gorlov P.
Ustrichnye Islands	700	3	Siokhin V., Gorlov P.
Kitai Island	2,270	3	Siokhin V., Gorlov P.
Chongarskie Islands	2,466	9	Siokhin V., Kostiushyn V., Gorlov P.
Koyanly Islands	506	3	Siokhin V., Kostiushyn V., Gorlov P.
Masliny Islands	544	2	Siokhin V., Kostiushyn V., Gorlov P.
Gas towers in Azov Sea	200	1	Siokhin V., Gorlov P.
Aktashkoe Lake	400	1	Siokhin V., Gorlov P.
Mysovskoe Forestry	5,150	2	Siokhin V., Gorlov P.
Obitochnaya Spit 1	800	1	Siokhin V., Molodan G., Gorlov P.
Obitochnaya Spit 2	18,000	1	Siokhin V., Molodan G., Gorlov P.
Krivaya Spit 2	352	1	Molodan G., Bronskova M.
Krivaya Spit 3	316	1	Molodan G., Bronskova M.
Bolshye and Malye Kuchugury Islands 1	20	1	Busel V.
Bolshye and Malye Kuchugury Islands 2	73	1	Busel V.
Bolshye and Malye Kuchugury Islands 3	430	1	Busel V.
Bolshye and Malye Kuchugury Islands 4	1,100	1	Busel V.
Energodar	1,240	2	Siokhin V., Gorlov P.
Svityaz' Lake	90	1	Gorban I.
Pischa Village area	7	1	Gorban I.
Grabovo Village area	5	1	Gorban I.
Yavorov Lake	14	1	Gorban I.
Burshtynskoe reservoir	11	1	Gorban I.
Kruglik Island	780	1	Grischenko V.
Koncha-Zaspa area	28	1	Atemas' N.
Kanevskoe reservoir	15	1	Atemas' N.
Kievskoe reservoir	69	1	Atemas' N.
Drozdy village pond	15	1	Kostiushyn V.
Total	44,597		

Three colonies in Ukraine contained more than 3,000 nests in 2012 (Fig. 39.3) and almost two thirds (64 %) of the breeding population was found in these three colonies (Fig. 39.4). The 12 colonies, ranging in size from 501 to 3,000 nests, contained 30 % of the breeding population. Finally over half of all colonies (58 %, 21 colonies) contained fewer than 500 nests, and these colonies had only about 7 % of all breeders in Ukraine.





Figure 39.3. Size distribution of Great Cormorant colonies in Ukraine in 2012.

Figure 39.4. Distribution of the Great Cormorant breeding population in relation to colony size in Ukraine in 2012.



A ground nesting colony of Great Cormorants on Chongarskie Islands on Sivash, 2012. Photo: Vasiliy Kostiushyn.

Human intervention in colonies and other factors

There is no legal, planned management of Great Cormorant colonies in Ukraine. Fisherman, hunters and foresters carry out illegal management actions quite regularly in different areas. There has been no systematic study of this issue in Ukraine, and no evaluation of how these actions impact the breeding Great Cormorant population in the country has been carried out. Nevertheless, cases of colony destruction are not uncommon. It is common for people to kill nestlings in ground nesting colonies or shoot hatching birds, sitting in their nests in tree nesting colonies. It is known that in some cases several hundred birds have been killed at the same time. Thus, it is most likely that the destruction of colonies has a local impact and in some cases the impact is extensive. For example, it is known that a sharp decrease in the number of breeding Great Cormorants in the Dniester delta during recent years is a result of colony destruction and shooting adult birds during the breeding season by fisherman.

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BREEDING NUMBERS OF GREAT COR-MORANTS *PHALACROCORAX CARBO* IN THE WESTERN PALEARCTIC, 2012–2013

IUCN/Wetlands International Cormorant Research Group Report

This report presents the status of the breeding population of Great Cormorants *Phalacrocorax carbo* in the Western Palearctic. The report gives an overview of numbers and distribution in 2012 and describes changes since 2006. It also compiles 38 detailed national and sub-national reports on breeding numbers, colony sizes, colony distribution and the extent of human intervention in breeding colonies.

In 2012 the continental sub-species *P. c. sinensis* was breeding with more than 370,000 pairs in the Western Palearctic. The EU-28 countries had 214,500 of the breeding pairs. Highest densities of this sub-species were found around the Baltic Sea (167,700 pairs), in The Netherlands (23,600 pairs) and around the Sea of Azov and the western and northern part of the Black Sea (82,000 pairs). The breeding population of the Atlantic sub-species *P. c. carbo* was estimated to 42,500 pairs with Norway as the most important breeding area.

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