Wetlands International

Cormorant Research Group Bulletin

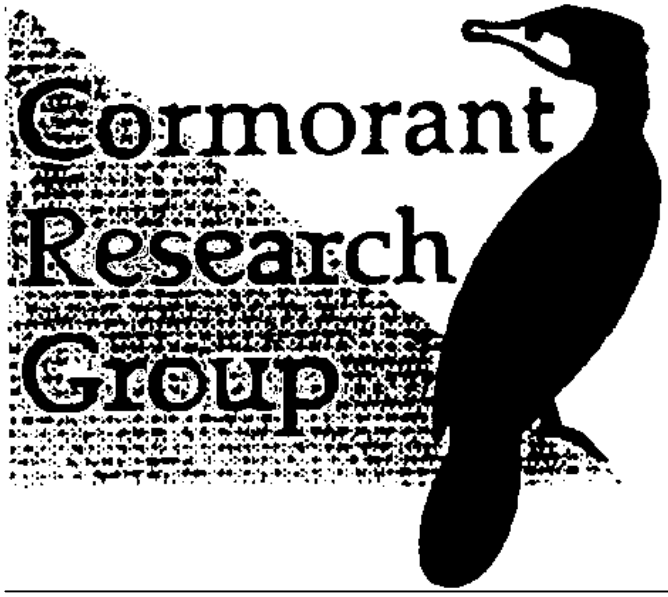
Number 6, July 2005

Ministry of Transport, Public Works and Water Management

Directorate-General of Public Works and Water Management

Institute for Inland Water Management and Waste Water Treatment RIZA

Wetlands International
Cormorant Research Group



The Wetlands International Cormorant Research Group was officially founded at the Third European Cormorant Conference in April 1993 in Gdansk, Poland. Its main aim is to facilitate the exchange of information on both ecology and biology of the different species of cormorants worldwide and on possible conflicts between cormorants and humen fisheries' interests. To achieve this goal, regular meetings and workshops are organised and, at least once a year, the Cormorant Research Group Bulletin will be published. Contributions of ornithologists as well as of fishery biologists and nature management officials to our activities are welcomed.

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EDITORIAL AND CRG NEWS

It is a pleasure for us to present hereby the sixth volume of the Wetlands International Cormorant Research Group Bulletin. From the editorial board we thank every one who has joined the group and contributed in this itemn! The activities of the group are mentioned below in brief:

1. The group participates in the Pan European project of INTERCAFE (see announcements).

2. REDCAFE, Volume I is available on the Internet, Volume II (country profiles) is being printed at this moment! It will be available on the Internet very soon.

3. For information please refer to the Cormorant Research Groups website which is coordinated by Stefano Volponi from Italy. On this site you can find any update information about the group's activities, plans and European ringing programmes (http://web.tiscali.it/sv2001).

4. We continue to publish the WI Cormorant Research Group Bulletin. Depending on activities and contributions, a number is prepared. This 6th number as well as former numbers are being published also on the website.

5. Breeding bird numbers will be counted on a Pan-European scale in 2006; this as a joint venture between the working group in INTERCAFE and Wetlands International CRG.

6. In January 2007 Cormorant roost counts will be organised all over Europe and North Africa (announcement elsewhere in this volume).

7. The Odessa proceedings will be produced as funds become available later this year.

8. The next International Cormorant Research Group meeting will be in Switzerland, 23-26 November 2005, see elsewhere this bulletin.

9. We continue to manage the database which records the developments of the European breeding numbers of the Great Cormorant.

10. Rectification for CRG-bulletin nr 5: Graph on page 32, food data from lake Veluwemeer (1989-1992) need to be referred to (Dirksen et al. 1995, Ardea 83: 167-184).

We hope you will enjoy reading this sixth issue!

Mennobart R. van Eerden & Stef van Rijn

After REDCAFE: an interdisciplinary approach to European Cormorant-fisheries conflicts (INTERCAFE)

Dave Carss, *Centre for Ecology & Hydrology, Hill of Brathens, Glassel, Banchory, Aberseenshire, Scotland (UK), AB31 4BW*

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Background

The REDCAFE project ("*Reducing the Conflicts between Cormorants and Fisheries on a pan-European scale*") was a two-year Concerted Action (2000-2002) funded under the European Union's Framework Five Programme. It addressed, for the first time, cormorant-fisheries conflicts on a European scale by establishing a very active network of research institutes across 25 countries, and including many members of the Cormorant Research Group. Focussing on the Great Cormorant (*Phalacrocorax carbo*), REDCAFE's final report (Carss 2003) is available at: http://banchory.ceh.ac.uk/redcafe/redcafedocs.htm

Cormorant-fisheries conflicts are a truly pan-European issue affecting a variety of stakeholder groups living and working in a diverse range of aquatic habitats across the continent. One of the most important aspects of REDCAFE's work, in relation to the provision of management solutions for cormorant-fisheries conflicts, was to show clearly that such conflicts are complex in terms of their biology but that social and economic issues are equally important: these conflicts are sometimes as much human:human ones as they are human:wildlife ones.

An interdisciplinary approach involving the collaboration of biological and social scientific expertise, economic and political interest and practical local experience was seen by REDCAFE as vital to the development and successful implementation of practical cormorant-fisheries conflict resolution strategies across Europe. The challenge was both to continue with relevant research and to improve information exchange, dialogue, participation and trust between all stakeholders involved in such conflicts. This challenge has recently been taken up by a new four-year, pan- European COST Action, INTERCAFE ("*Conserving Biodiversity - Interdisciplinary Initiative to Reduce pan-European Cormorant-Fisheries Conflicts*"). COST is an intergovernmental framework for European Co-operation in the field of Scientific and Technical Research, which promotes the building of scientific networks. In INTERCAFE, this involves the collaboration of biological and social science expertise, economic and political interests, and practical local experience.

INTERCAFE builds on REDCAFE's successful foundation by coordinating biological and social research programmes and integrating cultural, economic and political/policy concerns so that conflict resolution strategies can be devised, through collaboration with local people, that are tailored to the specific needs of local stakeholders and decision makers. Moreover, the international coordination of national research efforts through this COST Action will ensure that the opportunities to understand conflicts and learn from experiences elsewhere are exploited as fully as possible across Europe.

Goals

The main objective of INTERCAFE is to improve European scientific knowledge of cormorant-fisheries interactions in the contexts of the interdisciplinary management of human:wildlife conflicts and of sound policy formation, so as to inform policy decisions at local to international levels across Europe and to deliver a coordinated information exchange system and improved communication between all stakeholders. Project participants, currently covering 28 countries in Europe and beyond, will ultimately create a coordinated research network and an information bank that will be used to develop long-term collaborative management solutions to pan-European cormorant conflicts.

INTERCAFE is targeted towards the development of policy aimed at maintaining the favourable conservation status of Europe's cormorant populations whilst enabling the sustainable exploitation of fish stocks in a wide variety of aquatic habitats. To achieve this goal, which requires considerable coordination and synthesis, three Working Groups have been established. These Working Groups and their associated processed are integrated and will deliver a number of outputs (see below and Figure 28.1).

Work Group 1: Ecological databases and analyses
Addressing the issue of the management of cormorant-fisheries conflicts requires consideration not merely of technical solutions (i.e. site-specific actions and mitigation measures) but also of the ecology of cormorants at the continental level, particularly their temporal and spatial status and distribution and choice of breeding roosting and foraging sites. Analysis of these data at the continental scale in relation to ecological characteristics (e.g. geographical, climatological, biological – size, nutrient status, fish communities etc) through a Geographic Information System will provide better understanding of current cormorant distribution across Europe and could also allow predictions of their future distribution.

Cormorant population models are required to predict both the ultimate size of the European cormorant population and the likely consequences of large-scale control activities. The predictive power of such models depends on the input of the most up to date information – both on bird status and distribution but also ecological habitat data. The data collected in WG1 on cormorant population status and distribution, and on the numbers of birds killed, provides just such input and should lead to improved predictive models. Importantly, this Work Group will also collate information on lethal actions carried out against cormorants and improve understanding of the migratory patterns of cormorants particularly during the winter.

Work Group 2: Conflict resolution and management
Due to the site-specific nature of cormorant-fisheries conflicts, conflict resolution and management must be assessed on a case-by case basis. Work Group 2 will thus coordinate biological, social and economic assessments of actions and mitigation measures at local to national scales. Work Group 2 will also examine more closely the legal frameworks operating in relation to actions and mitigation measures (linked closely with Work Group 1) and consider economic aspects of specific fisheries.

The main objective of Work Group 2 is thus to conduct interdisciplinary research into site-specific actions and mitigation measures taken to manage cormorant-fisheries conflicts. Furthermore this research will also be linked to legal frameworks and economies operating at regional to national scales. The research community, in collaboration with local stakeholders and policy makers, will analyse and evaluate the success or failure of various actions and mitigation measures applied to cormorant-fisheries conflicts across Europe in relation to biological, social and economic factors.

Work Group 3: Linking science with policy and best practice
REDCAFE identified that research must first identify the true nature of cormorant-fisheries conflicts and then look to the most appropriate solutions. The overall aim of WG3 is thus to promote links between the biological and social science communities, local stakeholders, economists and policy advisors to better understand the role of socio-cultural issues in conflicts, their management within legal frameworks, and efforts towards their resolution. These links will be forged through the interdisciplinary investigation of a series of conflict case studies chosen to be representative of cormorant-fisheries conflicts across Europe.

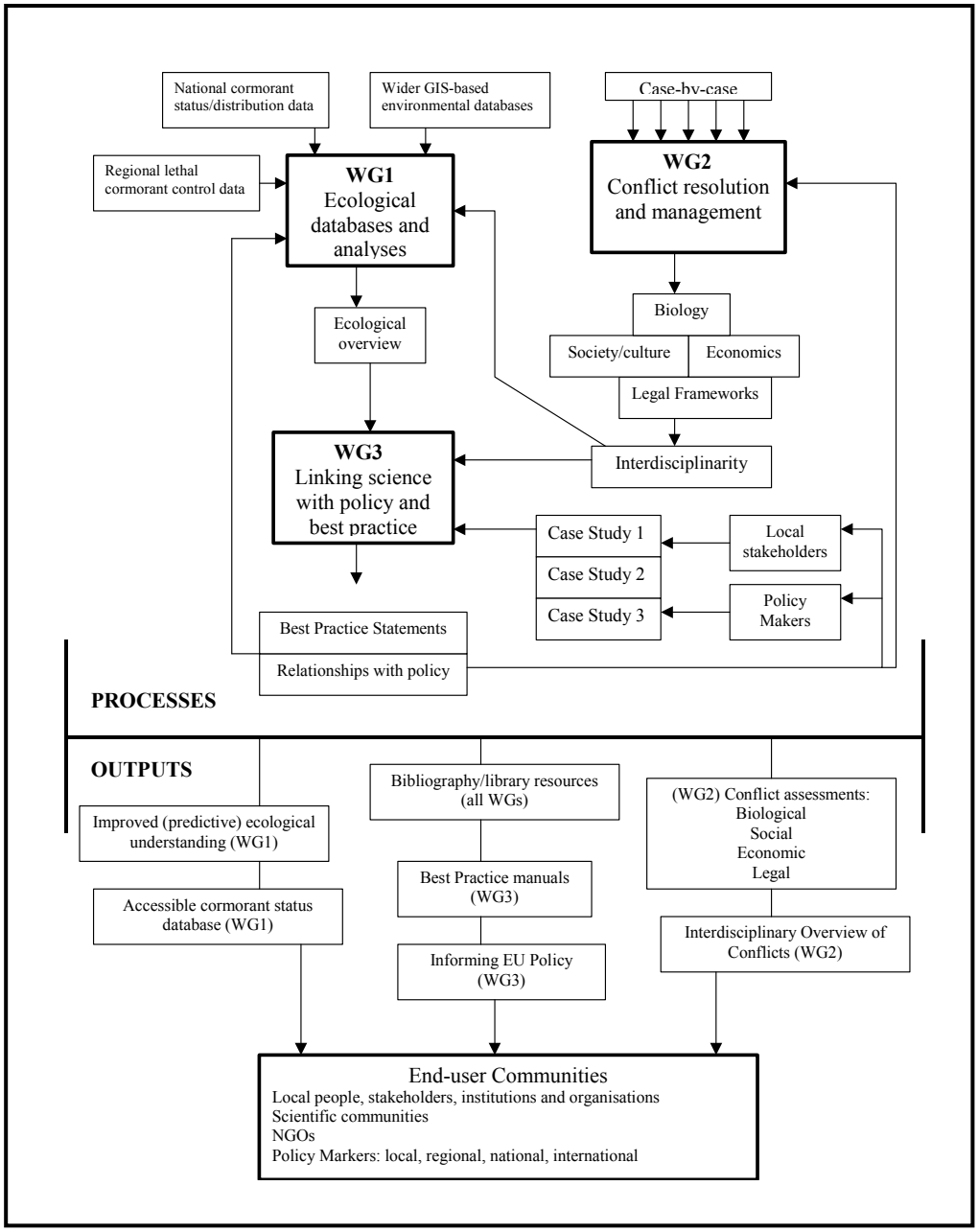
Case study selection will take into account various factors: for example, geographic location, habitat types, stakeholder groups, fishery type, and current and potential mitigation actions. Case studies will be investigated through Workshops that concentrate on issues operating at two spatial scales. First, local stakeholders will provide key site-specific inputs providing ecological, social, economic and policy contexts. Second, input from other participants, particularly ecologists (for example, through direct input from WG1) and policy makers, will enable all to appreciate the specific case study in both national and international contexts. Thus, Workshops will enable all participants to take a 'holistic' view of specific case studies.

Overall outputs
Outputs from INTERCAFE will thus include:

- Databases detailing both the size and location of European cormorant breeding colonies and winter roosts at the national level and the lethal management actions taken against cormorants at the regional level.
- Biological, social and economic assessments of the cost-effectiveness and efficacy of conflict resolution and management strategies through the interdisciplinary examination of site-specific, regional and national actions and mitigation measures taken to counter predation by cormorants.
- The promotion of links between the biological and social scientific communities, local stakeholders and policy advisors to better understand the role of socio-cultural issues in conflicts, their management within legal frameworks, and efforts towards their resolution. The development of a set of scientifically founded conflict management recommendations specifically aimed at improved policy formulation.

In addition, INTERCAFE includes a number of Sub-groups where researchers focus on a number of specific issues including Baltic Sea research, the ecology of Pygmy Cormorants (*P. pygmeus*), the production of a cormorant fieldwork manual, conflicts and mitigation at carp ponds, and potential sources of research funding.

Further information about both COST and the INTERCAFE Action (no. 635) are available at:
http://cost.cordis.lu
Further information about INTERCAFE will soon be made available on the Action's web site:
http://www.intercafeproject.net
or contact Dave Carss or Mariella Marzano, co-outhors of the Action.



INTERCAFE COST Action (635) Working Groups and proposed outputs

Monography: Cormorants and fisheries

Biologist and photographer Florian Moellers (www.florianmoellers.com) started working on a photo-reportage on cormorants and fisheries in March 2004. The project aims to raise awareness for the problem of the public and strives to present an intense photographic assessment of current conflicts with fish-farmers, fishermen and anglers and possible solutions for such problems. Moreover, images of the bird's biology, behaviour and scientific research on the species in different European countries will be an important part of the story. The book shall present latest scientific results in an understandable style as well as opinions of various parties involved with the conflict – from fishermen to conservationists. The publishing house interested in this project (www.gbraun-verlag.de) is well known in Germany for its well illustrated monographies on (problem) birds.

Together with Thomas Bregnballe and Mennobart van Eerden, Florian Moellers discussed the idea of an English edition of the book and chances to set up a travelling exhibition or multi-media presentation to be shown at Congresses, fairs and festivals on an international level. The photographic work will not be finished before September 2005 and Florian Moellers is most grateful for any contact that may lead to new photo opportunities or that will give him a chance to illustrate further fields of interest in the cormorant matter in this spring and summer. ANY offer is welcome!
Those, who would like to contribute to this project, either by offering photo opportunities or providing scientific data, is heartly invited to get in touch with Florian via email (photo@florianmoellers.com) or by
phone (cell +49 170 9375789).

In exchange, pictures taken at such occasions will be made accessible to the partners and can be used for scientific purposes. Pictures of Florian Moellers are published internationally in books and calendars and magazines like National Geographic, GEO, The New York Times, FAZ, BBC Wildlife and many others. Several of his photos have been awarded prices in international competitions.

ANNOUNCEMENT

Cormorant Research Group in co-operation with Schweizerische Vogelwarte Sempach

7th International Conference on Cormorants
4th Meeting of Wetlands International Cormorant Research Group
23 - 26 November 2005
Villeneuve (VD), Switzerland

Wetlands International Cormorant Research Group (Mennobart van Eerden)
Schweizerische Vogelwarte Sempach (Verena Keller)

We are very glad to announce that the 7th International Conference on Cormorants on behalf of the Cormorant Research Group will be held in Villeneuve, Switzerland, from 23 to 26 November 2005. It will be the 4th meeting after the Cormorant Research Group was formalised as a Wetlands International specialist group. There will be four main sessions and one round-table discussion. Workshops will be organised on specific themes. The CRG meeting will be organised and discussion on progress of Cormorant studies and future developments will be scheduled. There is a good chance to see Cormorants at the famous roost in "les Grangettes" where the Rhone River meets the lake as we are organising the meeting at the shores of Lake Geneva, in Villeneuve, near Montreux.

Call for Papers
There will be ample opportunity to present papers on all topics mentioned in the programme. Talks will be ca. 20 min. long. Poster size will be 60 x 120 cm. To submit a talk or a poster it is necessary to send an abstract no longer than 250 and 150 words, respectively. The deadline for registration and submission of abstracts is 30 September. Abstracts should follow the example below. Please, provide name(s), post address(es) and email address(es) of the author(s). Indicate speaker with an asterisk. Put the title in capital letters. Then followed by the text. All abstracts must be submitted by email to the following address:

s.vrijn@riza.rws.minvenw.nl

example:

JONES, THOMAS F.* and G. HENK KERK, Zool. Department, University of Lelystad, NL-8241AC Lelystad, The Netherlands.
t.jones@prt.nl and University of Lelystad, Lelystad, The Netherlands.

Daily food requirements of Great Cormorants wintering at a Dutch canal.

The daily food intake (DEE) of wintering Great Cormorants (*Phalacrocorax carbo sinensis*) was studied using the method of direct observation of……

Language
All communication will be in English.

Proceedings
We are currently investigating the possibility of producing the conference proceedings afterwards, possibly in 2006. To achieve this goal it is necessary that all authors make their final papers available soon after or, preferably, during the conference.

Final Registration
The return of the enclosed form will ensure the sender the receipt of the second and final circular in September. Then we will schedule the full programme with titles of contributions at length.

Registration Fee and accommodation

Conference registration fee is € 100. It includes the Conference Information package and proceedings (incl. abstracts of papers, etc.) as well as the excursion. Costs for full board are, depending on hotel ca € 50 - € 115 per day. Currently we are investigating details, which are to become available in August.

Venue
The conference will be held in Villeneuve, at the "Conseil Communal", Village Hall. The village of Villeneuve is easily reached by train or car. The Geneva airport is 1.5-2h by train away from the venue. Participants are expected to arrive on Wednesday 23 November 2005 afternoon or evening.

Accommodation
All participants will be accommodated in hotels in Villeneuve. If a large number of people would require this, the youth hostel could open its doors (shared rooms 4-8 people, c. 20 € pppn).

Preliminary Programme

23 Nov. (Wednesday)
Arrival
Evening:

- Film and technical workshop (ringing schemes, catching techniques)

24 Nov. (Thursday)
Morning:

- European census 2004-2005 (Population dynamics in summer and winter)
- Cormorant management (Parallels between Europe and North America/Canada)

Afternoon:

- Food and fish stocks revisited (Feeding ecology)

Evening:

- Reception by local authorities (provisionally scheduled)

25. Nov. (Friday)
Morning:

- Interaction with human interests (fisheries, fish farms, forest etc.)

Afternoon:

- Telemetry and remote control studies,
- Round-table discussion on the future activities of the Cormorant Research Group
- Evening:
- Poster session

26 Nov. (Saturday)
Morning:

- Excursion to lake Geneva, Cormorant roost at “les Grangettes”

Afternoon:
Departure of participants

Delayed breeding during harsh weather events in the Great Cormorant

Stuart E. Newson[1] & Baz Hughes[2]

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The influence of within and between year variation in weather conditions on timing of breeding and breeding performance has been little studied in cormorants, although environmental conditions are thought to modify breeding performance and timing of breeding in great cormorants (e.g. Sellers & Hughes 1996; van Rijn 1998; Bregnballe *unpubl. data*) and the closely related shag *P. aristotelis* (Aebischer & Wanless 1992). In the shag, the mean number of chicks fledged per pair on the Isle of May, Scotland between 1973 and 1987 was 28% lower in years of harsh weather conditions and non-breeding was common, with up 60% of adults skipping breeding in these years. At present there is evidence to suggest that non-breeding can occur to such an extent in the great cormorant, although it is difficult to distinguish the direct effect of harsh weather events from indirect factors related to food supply or ability of cormorants to obtain this resource (van Eerden *et al*. 2003).

As part of a study of breeding performance and timing of breeding of inland and coastal breeding great cormorants in England and Wales (Newson 2000), warmer spring weather in 1998 was thought to have advanced the onset of breeding by an average of two weeks at the majority of inland cormorant colonies in this year. Harsh weather conditions may additionally delay breeding until conditions improve. At the Kąty Rybackie cormorant colony in Poland for example, breeding was considerably delayed in 1996 as a result of ice-cover which persisted until mid-April (Stempniewicz *et al*. 2000), and a similar effect of late-ice cover has been observed from a number of other European colonies (e.g. van Eerden & Zijlstra 1995). In our study, cold weather is thought to have delayed breeding at Haweswater in 1998 (Figure 1). Ideally long-term data from a number of colonies would be required to better understand the relationship between weather conditions, food availability and the control of breeding.

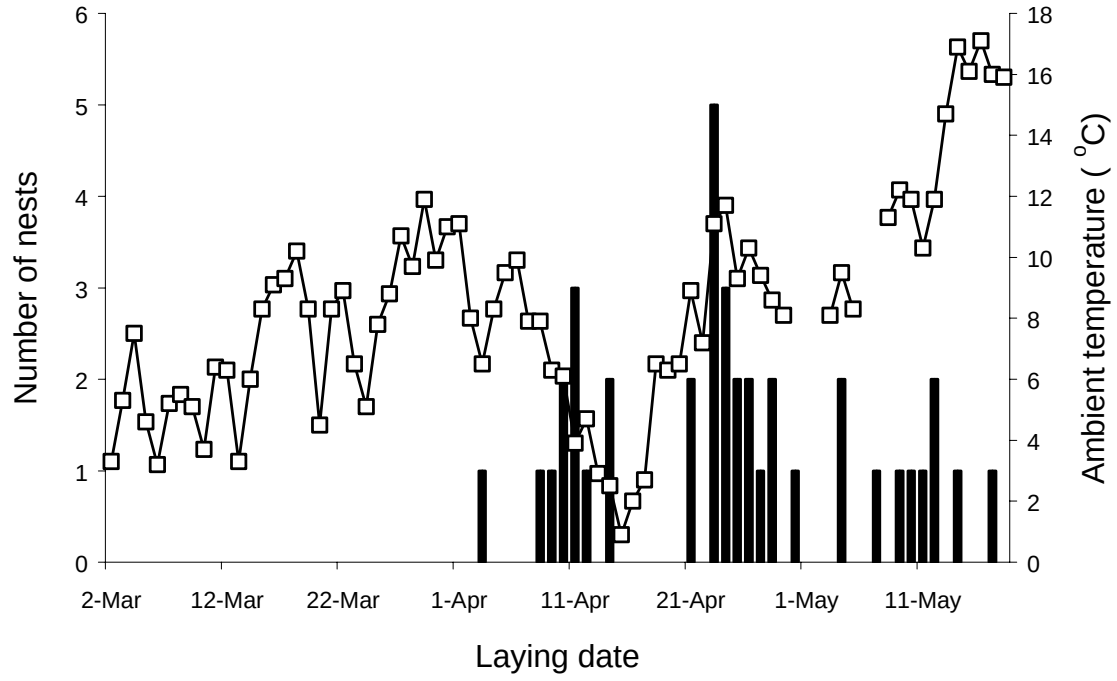

Figure 1. The effect of temperature (line) on the number of great cormorant *Phalacrocorax carbo* nests initiated (columns) each day at Haweswater, Cumbria, UK in 1998. Laying date is back-calculated from hatch date assuming a thirty day incubation period. Daily ambient temperature (^{o}C) supplied by Keswick metereological station (Met. Office data).

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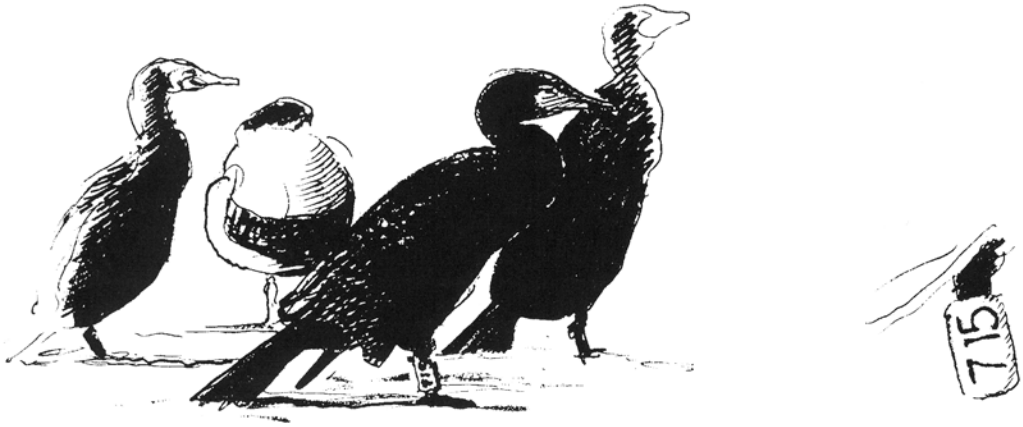

Variability of Great Cormorants (Phalacrocorax carbo l.) morning dispersal during winter time

Geoffroy EVRARD[(1)], Frédéric DERMIEN[(2)], Patrice de GOTTAL[(2)], André MONMART[(2)], Francis POURIGNAUX[(2)], Philippe VANMEERBEECK[(2)] & Jean-Yves PAQUET[(2)]

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Introduction

Following the emergence of many conflicts between the Great Cormorant and the fishing community, understanding of winter resources utilisation mechanisms by this species became the central topic of many researches. The present study relates to the river Meuse, which accommodates a significant part of the Great Cormorants wintering in Southern Belgium (Paquet & la Centrale Ornithologique Aves, 2002).

This study aims at evaluating the Cormorant fishing pressure on river sections in the surroundings of a major winter roost, in order to assess possible variation in the relative fishing pressure between the different river sections in the course of the winter period and between years. The determination of Cormorant fishing pressure (number of fishing Cormorants by day) for one of the studied river sections, where fish populations are well described, along with data on Cormorant diet, also lead to an estimation of the impact of predation on local fish population. This part of the results is presented elsewhere (Evrard *et al.*, 2005).

The space utilisation by foraging predators constitutes an essential data in predation studies (Curio, 1976). Each evening, wintering Great Cormorants gather in communal roosts sheltering sometimes several hundreds of individuals. Early in the morning, Great Cormorants depart all together from the roost and disperse to reach their respective fishing sites. The foraging activity occurred mainly in morning (Builles *et al.*, 1986). The bird can fly 20 to 30 km, starting from the roost, to reach a fishing site (Lekuona & Campos, 1998; Parz-Gollner, 2003). The flight dispersal patterns around the winter roosts proved to be variable both between year and within the winter period in the Po Delta (Boldreghini *et al.*, 1997), while, in other wintering area, few variability in patterns were observed, suggesting individual fidelity to fishing grounds (Builles *et al.*, 1986).

Study site and methods

The river Meuse crosses the southern part of Belgium (Wallonia), between France and the Netherlands, over a distance of 182 km. Most of its banks were canalised and 16 dams control the flow in order to facilitate navigation. A significant number of natural spawning sites have been destroyed at the time of the canalisation (Philippart *et al.*, 1988), strongly altering the population dynamics of most fish species.

There are 9 Great Cormorant roosts along the Belgian Meuse, accounting for more than 2000 wintering individuals. The study was conducted around the Vas-t'y-Frotte island roost (Fig. 1; 50°26' N, 4°51' E), the most important roost of the upper part of the river Meuse with, for example, a maximum of 858 cormorants counted January 8, 2002.

Our observations are made only during the morning fishing action, which concerned almost the totality of the birds present at the roost. The dispersion surveys proceeded in the following way: before first light of dawn, the observers reached strategic places which delimit the river Meuse in 4 different sections (Fig. 1 B). At the beginning of the Cormorant dispersal, each observer recorded, minute per minute, bird movements directed either upstream or downstream their observations place. Observations stopped approximately one hour after the first recorded movements, when the foraging trips generally end. During the winter 2001-2002, 6 surveys occurred between December 22 and March 2. During the winter 2002-2003, 9 surveys were carried out between January 19 and March 30. A census of the roost took place each day before the dispersion survey. Proportion of Cormorants dispersing in each river sections, expressed as the percentage of birds present at roost, were calculated from the morning surveys.

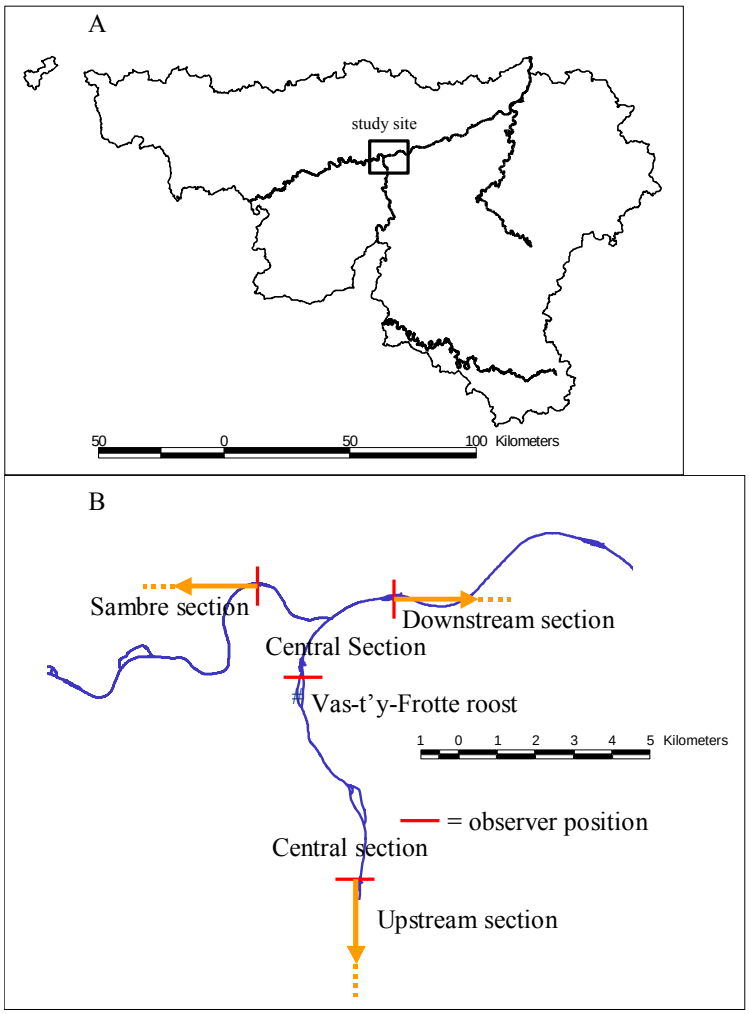

Figure 1A : The location of the study area in Wallonia (Southern Belgium); B: Vas-t'y-Frotte roost and river sections near Jambes.

Results

Figure 2 summarised observations on proportion of dispersal on the various river sections. In both studied winter, the vast majority of Vas-t'y-Frotte birds moved downstream or stayed in the central zone and never more than 10 % of the birds are going towards the upstream section (Fig. 2 A & B). Apart from this obvious constant in the patterns, there seems to be a great deal of variability in the choice of the other river sections, both within a winter period and between years. This variability seems to emerge from the choices of large feeding groups to go for mass fishing either in the river Sambre or in the downstream section of the river Meuse. While the Cormorants heading upstream practise mainly the solitary fishing technique, the majority of birds going downstream or towards the Sambre gather in 10-150 individuals feeding flocks hunting shoals of fish along the artificial steep river bank (data not shown).

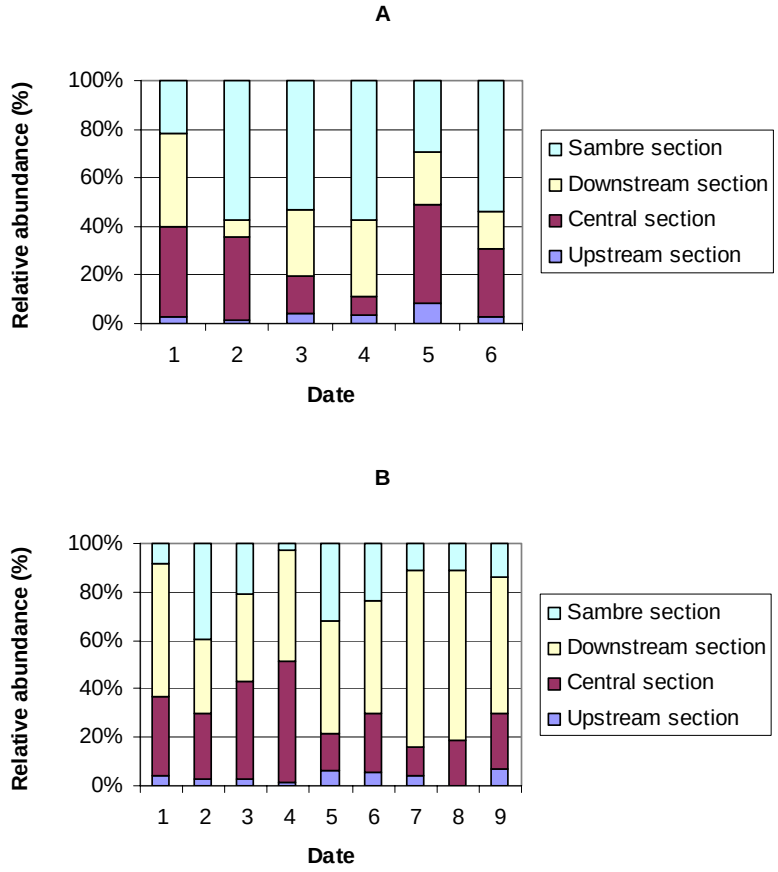

Figure 2 : Proportion of Cormorant dispersing in the 4 considered river sections ; (A) winter 2001/02 (dates 1-6 : 22.12.01, 05.01.02, 18.01.02, 02.02.02, 16.02.02, 02.03.02); (B) winter 2002/03 (dates 1-9 : 19.01.03, 02.02.03, 09.02.03, 16.02.03, 23.02.03, 09.03.03, 16.03.03, 23.03.03, 30.03.03).

Total numbers of Cormorant declined regularly in the course of both survey periods: from 742 birds on the 22/12/2001 to 410 on the 2/3/2002 and from 746 Cormorants on the 19/01/2003 to 116 on the 30/03/2003. This decrease reflects progressive departure to breeding countries. By testing Spearman correlation between total numbers and proportion of dispersal in each river sections, we assessed if this seasonal decline in Cormorant total numbers could be related to a change in foraging Cormorant river section selection. In 2002-03 winter, but not in 2001-02, the proportion of birds heading towards the upstream section is inversely correlated to total number at the roost ($R_s = -0{,}867$; $p<0{,}05$). This means that, while the

overall number of birds going to this section is declining, the decline is slower than in other river sections. The reverse applied for the central section in 2002-03: the proportion of birds foraging in this area declined in a correlated way with the total numbers (Rs = 0,617; p=0,07). No clear tendency emerged for the two other river sections (Fig. 2): the river Sambre section was less rapidly abandoned by dispersing Cormorants than the downstream section during the course of the winter 2001-02, while the reverse applied during the winter 2002-03.

Discussion

River Meuse around the studied roost was not exploited for fishing everywhere with the same intensity. Cormorants showed a nearly exclusive preference for the downstream area, being distributed between the river Sambre or in the downstream section. Only up to 10% of the Cormorants were heading upstream. Moreover, the upstream section of our study area is not used by birds coming from other roosts, located upstream on the course of the river. This selection of particular fishing area is also observed in other conditions: Grémillet *et al.* (1999) showed that the Great Cormorants, at sea, preferentially used only 25% of the potential foraging area. In our case, a relation between this site selection and prey availability can be hypothesised. Indeed, the biotic and abiotic conditions are better downstream for Cyprinids. The junction with the river Sambre, of high eutrophic level, and the presence of several docks (quiet places where fish are aggregated), create condition for a greater density of Roach. Downstream sections, more urbanised, are canalised and banks in concrete and blocks facilitate collective fishing by Great Cormorants.

The variability of site selection in the downstream areas (alternative of fishing either in the river Sambre or in the downstream sections) is somewhat in contrast with the image of a stable pattern of Cormorant dispersal, as in Vendée, France (Builles *et al.*, 1986). It is also in contrast with observation of colour-ringed bird at diurnal resting sites in our study sites: long-staying ringed birds were observed several consecutive years resting the whole winter near the same fishing sites (P. Lacroix & pers. obs, unpublished data). One possible explanation is that Cormorants, after fishing, move to their regular resting-place independently of where they were fishing but this seems unlikely because of the high energetic cost of flight. Another possible explanation is that, although long-stayer birds can show a day-to-day stable pattern, short-stayer Cormorants, which account for a significant part of the Cormorants using the river Meuse valley in the winter (Paquet *et al.*, 2003), could be more variable in their selection of fishing grounds. It would also be interesting to assess seasonal or yearly prey abundance modifications of certain sections.

The seasonal decrease in Cormorant numbers, linked to progressive departure to breeding areas, is not reflected by a uniform decrease in fishing ground frequentation. Some river sections are abandoned less rapidly than others are. This interesting observation raises numerous questions, as this non-uniform decline could be indicative of the existence of sub-optimal fishing areas around the roost, occupied because of the saturation of the optimal foraging areas. As the total number decreases, the competition for the optimal foraging area could be lifted and proportionally more Cormorants could make use of the optimal zone. This hypothesis may be related to a "buffer effect", known to be a potential regulatory mechanisms of migratory bird populations (Gill *et al.*, 2001). However, a great deal of work remains to be done to test these hypotheses.

Acknowledgements
For early morning field assistance, we thank Arnaud Laudelout, François Darchambeau, Sylvain Flamant, Nathalie Evrard, Yves Mine, Laura Spano, Jean-Pierre Albert, Laurent Trussart, Olivier De Clerck, Louis Gevers et William Wauthier. This work was carried out with the financial support of the Formation Funds for Industry and Agriculture Research (F.R.I.A.).

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The Present Status of Pygmy Cormorants (Phalacrocorax pygmeus) in Hungary

Péter Szinai

Introduction

The Pygmy Cormorant has bred in Hungary during the 19th century probably until the control of the largest Hungarian rivers (Danube, Tisza). After the extinction of the species, breeding attempts were noticed only occasionally during the second two decades of the 20th century. (Kovács 1998, Oláh & Konyhás 2004). Since the early 1980's the number of observations has increased and first re-colonisation was suspected in 1989 (Kovács 1991,1998) and proved in 1991 at Hortobágy (Kovács, 1991). Since then the species breed regularly in Hungary. The number of breeding pairs is increasing and the distribution is expanding (Oláh & Konyhás 2004).

The present breeding status and nature conservation aspects

The Pygmy Cormorant is a strictly protected species in Hungary. The person who perils one specimen of the species can be fined 1000 EUR or can be sent to a three-year imprisonment. All breeding sites are situated in protected areas, mainly in mixed heron colonies (see Table 1.). In year 2003 the Hungarian breeding population was estimated at 225-291 counted at four breeding sites, while in year 2004 there were 198-220 breeding pairs counted at five sites. The feeding areas of breeding pairs lie also mainly on protected areas. Unfortunately, some of these feeding sites are private owned and used for intensive carp production. In favour of fish farming the shooting of Great Cormorant (Phalacrocorax carbo) is permitted at these fishponds. Despite of this risk factor the population is still steadily growing.

Migration and wintering

We have no information on the wintering sites and the migration routes of the populations breeding in Hungary. There is no recovery data found in the Hungarian Ringing Data Bank. Large number of Pygmy Cormorants can be seen at roosting sites especially around Hortobágy (maximum 840 individuals) in September and October (Oláh & Konyhás, 2004). At mild winters, some dozen of birds winter over on the non-freezing water bodies of Hungary (River Danube, River Tisza). In the last years up to 60 individuals over-wintered on the Danube at Bratislava (Slovakia) close to the Hungarian border (Danko et al., 2002). This is quite interesting as this site is approximately 150 kilometres northwest from the nearest Hungarian breeding place. I think the majority of the Hungarian breeding population leave Hungary and winters over on the Balkan Peninsula.

Further studies

We have decided to start a colour-ringing project in year 2005 as to solve the problem of the lack of information on the Hungarian breeding population of the species. We will use alphanumeric codes on green rings with white inscription.

Colony	Year of coloni-sation	Number of BP in 2003	Number of BP in 2004	Type / nature conservation status of breeding colony	Type / nature conservation status of feeding places in breeding season	Shooting of Great Cormorant in breeding season	Source of information
Hortobágy National Park 47°38'N 21°05'E	1991	Two sites 160-200 pairs	Two sites c. 100 pairs	On protected fish ponds in mixed heron colonies	Mainly fishponds, all protected, but only partly state-owned	Possible*	Oláh & Konyhás (2004) Pers. comm. Zsolt Végvári
Tiszaalpár 46°50'N 19°59'E	2000	3-4 pairs	8-10 pairs	On protected marshland in mixed heron colonies	Marshland, death branches of River Tisza, partly protected, partly state-owned	Not possible	Pers. comm. István Bárthol
Kisbalaton 46°40'N 17°15'E	2000	50-70 pairs	80-100 pairs	On protected marshland in mixed great cormorant colony	Marshland protected, state-owned	Not possible	Pers. comm. Balázs Horváth & Szabolcs Benke
Biharugra 46°58'N 21°35'E	2002	12-17 pairs	8 pairs	On protected marshland in mixed heron colony	Fishponds protected, not state-owned	Possible	Tőgye J. (2002, 2003)
Soponya 47°02'N 18°28'E	2004	?	2 pairs	On protected fishponds in mixed heron colony	Fishponds protected, not state-owned	Possible	Pers. comm. István Staudinger

*Shooting licence is given only after the training of the hunter and the examination of the certain site by the expert of the responsible National Park Directory

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Global population development of the Pygmy Cormorant Phalacrocorax pygmeus

Overview of available data and proposal to set up a network of national specialists

Paul Voskamp, Stefano Volponi & Stef van Rijn

The Pygmy Cormorant is a colonial water bird that has a limited breeding range in the south-east of the Western-Palaearctic region. The species is poorly-known and vulnerable; it suffered a large-scale decline since the second half of the 19th century because of drainage and degradation of wetlands, persecution by fishermen and destruction of breeding colonies (Cramp & Simmons 1977, Collar & Andrew 1988). The species was placed on the Red List of Globally Threatened Species as "near threatened" (Birdlife 2004b) and was listed in category 1 of Species of European Conservation Concern (Tucker & Heath 1994, Birdlife International 2004a). In 1999 a Species Protection Plan was prepared by Birdlife International that aimed to halt the decline of the Pygmy Cormorant in Europe and to restore the species in its former European range (Crivelli *et al.* 1996). When this action plan was drawn up, the authors concluded that from large parts of the European distribution area data on numbers and trends were scarce or absent. Many from the actions listed in the plan therefore comprised the collection of adequate information on exact distribution and number, as well as the setting up of a monitoring scheme to investigate trends. Crivelli *et al.* (2000) subsequently published an overview, comprising many data from the former USSR not previously published in a Western-European language. Detailed information from the countries that hold the largest populations (Azerbaijan, Romania, Serbia and Montenegro, Ukraine), however were not available. This resulted in world population estimates that are not very accurate: 13.000 - 25.000 breeding pairs (Rose & Scott 1994, 1997); 22.345 - 27.055 breeding pairs (Statterfield & Capper 2000); 21.965 - 27.285 breeding pairs (Crivelli *et al.* 2000) and 21,393 – 37,323 breeding pairs (Delany & Scott 2002).

Knowledge about the species' status and trend throughout its range is essential for the planning and evaluation of monitoring and conservation efforts. In most countries within the species range efforts have been made to make good estimates of the population's size and to locate all colonies during recent years. In this article we present an overview of the currently available population data. We discuss reasons for the observed trends, and the possible implications for conservation and monitoring. Finally we propose to set up a network of national or regional specialists throughout the species' range to be able to closely monitor the future population development and to set up joint research projects.

Methods

Data on breeding Pygmy Cormorants were collected by literature research and by contacting regional ornithologists and specialists on colonial waterbirds. For breeding sites from which we obtained no new data, this overview leans mainly on the literature research by Crivelli *et al.* (2000). The sources they cited are also mentioned in the text, when appropriate. For these areas we also consulted the Important Bird Area database (Birdlife 2003).

Results

Figure 1 shows the distribution of Pygmy Cormorant breeding colonies (with the 10+ colonies in the Romanian Danube Delta depicted as a single dot). The dot size is relative to the number of breeding pairs. For this we used the most recent count available. When numbers in the colony were estimated, we used the upper limit of the estimate. Colonies present in the 1990s that were known to have disappeared in later years are not shown. The information used was usually gathered between 1997 and 2004. For some colonies older data was used. The total number of breeding pairs counted in all colonies together is 22.715 – 24.353 breeding pairs. Below we list the available information on breeding colonies by country/geographic area.

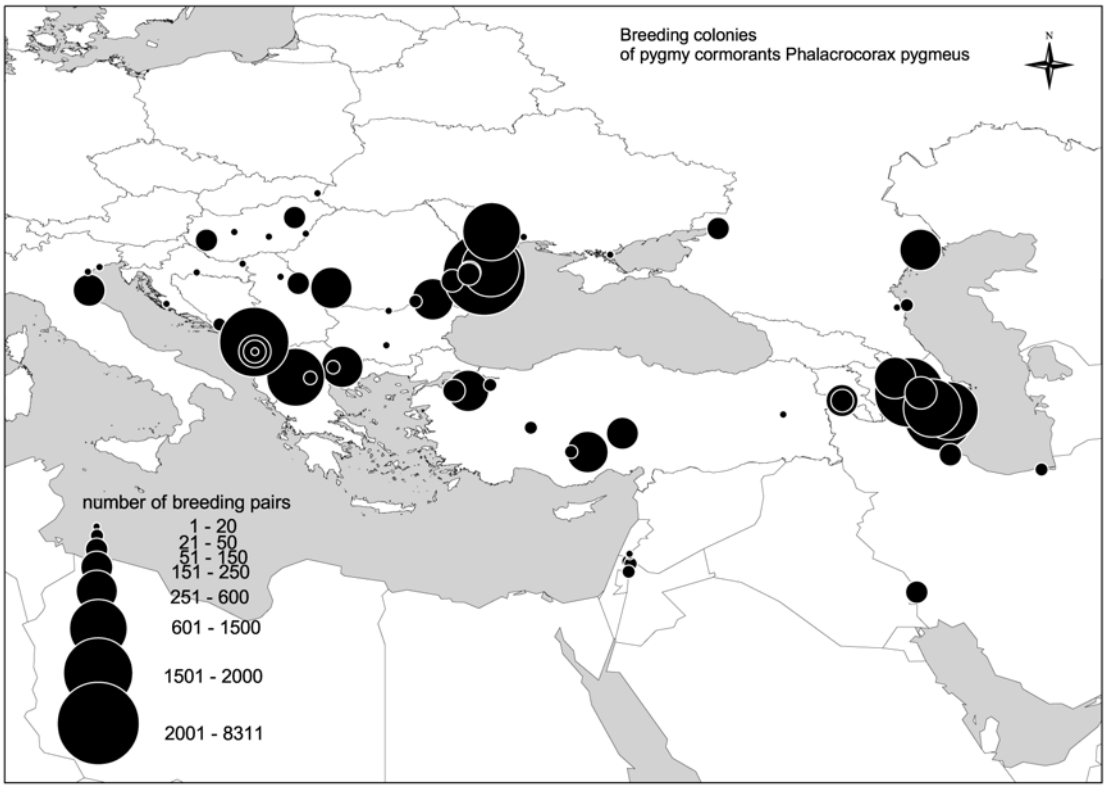

Figure 1. Distribution of Pygmy Cormorants breeding colonies in the species' global breeding range.

Albania

Pygmy Cormorants probably stopped breeding in Albania during the late eighties or early nineties (Willems & De Vries 1998, Zekhuis & Tempelman 1996, Vangeluwe *et al.* 1996). Before 1996 100-300 pairs were known to breed in Albania. The large numbers of birds present at the Albanian part of Lake Skadar most likely originated from the Crni Žar colony at the Montenegrin side of the lake, and were probably erroneously taken for breeding birds from Albania by several authors (e.g. Cramp *et al.* 1998). In the Bojana/Buna Delta at the Montenegrin border, in 2003 a colony was found in the marshes of Velipoja Reserve (220 pairs) (Stumberger & Sackl 2004, Euronatur, M. Schneider-Jacoby pers. comm.). In 1996 this site was not occupied (F. Willems). The Albanian waters are important feeding areas for breeding birds from just across Albanian's borders (Skadar, Bojana/Buna, Prespa).

Armenia
In 1994 there were 60 breeding pairs in one colony (Crivelli *et al.* 2000, Petrosyan & Petrosyan 1997) NACRES (2002), mentioned 1000-1500 resident individuals in the valley of river Araks (banks of rivers Metsamor, Razdan and fish farms in Ekhegnut, Masys & Armash), comprising 300 breeding pairs minimally (Giorgi Darchiashvili, Boris Gabrielian pers. comm.).

Azerbaijan
More than half of the world's population reputedly breeds in Azerbaijan. Recent data however are absent. Cramp *et al.* (1998) reported 4800–5800 pairs and a marked increase in the Lenkoran lowlands in 1980's. In 1986 the population was estimated at 14.749 breeding pairs mainly in Lenkoran and Kura-Araks lowlands; a high figure that has been questioned (Crivelli *et al.* 2000, Stoskaya & Krivenko 1988). Perrenou *et al.* (1994) reported a drastic decline in the Caspian region. Counts of wintering birds in Azerbaijan (Paynter *et al.* 1996) however did not support this. NACRES (2002) mentions the presence of 28.000 individuals in 1998. The number of breeding pairs is not exactly known but is estimated to range between 10.000 and 12.000 breeding pairs (Elchin Sultanov, Elshad Askerov, Nigar Agayeva pers. comm.). The total number of breeding pairs from known colonies however does not exceed 6500 pairs. Breeding colonies are known from Lake Ag-gel, (max. 1800 pairs) Lake Mahmud-Chala (500-800), Lake Beuk-Shorgel (c. 50 pairs), the delta of the Kura river (1300 pairs), Kizil-Agach Bay (1400-2000 pairs). Breeding Pygmy Cormorants were also known from Lake Sarisu (166 in 1998) and the Varvara reservoir (348 in 1998) (Patrikeev 2004; BirdLife International, 2003). Patrikeev (2004) lists the Pygmy Cormorant as vulnerable in Azerbaijan.

Bosnia and Herzegovina
Breeding of Pygmy Cormorants in large colonies at Hutovo Blato in Herzegovina was mentioned by Reiser (1939), who already reported a decline in 1914 (Obratil 1969). In the sixties breeding Pygmy cormorants were found in this area along the Krupa river (Sage 1964, Jonkers 1969). Sage (1964) roughly estimated 20 breeding pairs present in 1963. Obratil (1969) found approximately 40 breeding pairs in a mixed colony at the Deranjsko Jezero, a part of Hutovo Blato, during his fieldwork in 1965-1967. Rucner (1998) mentions 20-30 pairs in a colony Eastern part of Deransko Jezero in 1967. Grimmet & Jones (1989) mention breeding Pygmy Cormorants at this site, but do not give an estimate of the number of pairs present. In 2000, however, the species was still present at the site, with presumably 40-50 pairs breeding in a mixed colony (Kotrosan, D. & S. Obratil in lit.). In august 2001, 280 Pygmy Cormorants were observed feeding in the area (P.J. Voskamp), which could well indicate a higher number of breeding pairs. In 2003 however only 10-15 pairs were found in the area (Matić S. pers. comm.). Large parts of the Hutovo Blato marshes have been destroyed by the creation of a reservoir in 1979 (Obratil, 1985, 1996). This reservoir, however, forms suitable feeding habitat for Pygmy Cormorants. In August 2002 15 Pygmy Cormorants of unknown origin were observed at the reservoir in the Drina river near Zvornik (P.J. Voskamp).

Bulgaria
Nankinov 1989 mentioned that many colonies disappeared in Bulgaria. Crivelli *et al.* (2000) mentioned 60-180 pairs in 1990's. In the late 1990s however, the species increased to 350-370 pairs, with the largest colony at lake Srebarna (300 pairs) and 40-50 pairs at Riahavo, a Danube island, and a further 5-10 pairs at other Danube locations (Ivailo Nikolov, Peter Shurilinkov and NGO "Green Balkans" unpublished data).

Croatia
Until the seventies the species was known to breed in Kopački Rit, in the continental part of Croatia, (Mikuska & Majic, 1971-1972; Mikuska & Pivar, 1980; Ouweneel, 1982). In 2001 the species returned to this area, with 5-10 pairs breeding (T. Mikuska & J. Mikuska). In 2002 breeding of 4-8 pairs was confirmed in Lonjsko polje Nature Park along the Sava river (D. Kovačić, V. Dumbović-Ružić pers. comm.) while in Kopacki rit adult birds were observed throughout the season, presumably breeding (T. Mikuska pers. comm.). During 2003 the species ceased nesting in the continental part of Croatia due to the extreme drought that was extending throughout the season. In 2004 1-3 pairs were observed in the mixed colony of Krapje Đol in the Lonjsko polje Nature Park (M. Schneider-Jacoby pers. comm.). During post-breeding dispersal Pygmy Cormorants can be observed along the Drava and Sava rivers, and several fish-pond areas in the Croatian lowlands (T. Mikuska pers. comm., P.J. Voskamp).

Although breeding in the mouth of the Neretva river is known from the historical situation (Matvejev & Vasic 1973), authors disagreed about the recent situation in Dalmatia, the Mediterranean part of Croatia: e.g. Lukac (1998): "regularly nesting" in north and south Dalmatia, referring to Vransko Jezero and the Neretva Delta, opposed to Kralj (1997): no confirmed breeding in Dalmatia. Breeding was suspected in 1996 at Vransko Jezero, based on summer observations (Vogrin, 1998). In 2000 and 2001 there were indications of nesting Pygmy Cormorants on Vransko Jezero. In 2002 finally breeding was confirmed at Vransko Jezero, with 11 pairs breeding (Radović *et al.* 2003, V. Žitko pers. comm.). In 2003 and 2004 the colony continued to exist, despite of large scale habitat destruction caused by the burning of reed vegetations (D. Radović pers. comm.). In Krka National Park in Southern Dalmatia at least 15 Pygmy Cormorants were seen foraging on the Krka river (P.J. Voskamp). In the Neretva Delta, in Southern Dalmatia, small groups of Pygmy Cormorants are observed regularly in summer. At these locations breeding has not been confirmed (D. Kitonić & T. Mikuska pers. comm.); observations may well concern dispersed birds from breeding populations elsewhere (Montenegro, Herzegovina).

Greece
In 1997 1250-1310 breeding pairs were counted in Greece at three wetlands: Lake Miki Prespa (730-780 pairs), Lake Kerkini (500 pairs in 1997) and Lake Petron (15-30 pairs) (Kazantzidis & Nazirides 1999, Willems & De Vries 1998).

Hungary
The Pygmy Cormorant colonised Hungary in 1991, showing a strong increase in number of breeding pairs. In 2003 the Hungarian breeding population was estimated at 225-291 pairs at four breeding sites, while in 2004 there were 198-220 breeding pairs at five sites (Szinai 2005).

Iran
Crivelli *et al*. (2000) mention 20-30 pairs in wetlands along Caspian Sea and probable breeding in mangroves of Khur-Khuran along Persian Gulf. F. Willems (*in lit.*) stated that breeding along the along the southern half of the Persian Golf, the Strait of Hormuz and the Sea of Oman is not probable because of the absence of fresh water habitats. A large breeding population is reported from the Hoor Al Azim marshes in Mesopotamia, Khuzestan province, at the border with Iraq (Hamid Amini *in lit.*). Breeding in wetlands along the Caspian Sea is reported for Miankaleh Wildlife Reserve (probably less than 50 pairs), and the Mordab Anzali

Complex with nests found in May 2001 and June 2003 and 310 individuals present at this site on August 4, 2002 (M.E. Sehhati, Hamid Amini pers. comm.).

Iraq
Large colonies were present in the Mesopotamian marshes of southern Iraq in the mid seventies (Cramp & Simmons 1977). Large-scale destruction of habitat is known to have taken place after the end of the first Gulf War in 1991, destroying more than 90% of the marshland. Restoration actions were taken from May 2003, resulting in reflooding of up to 40% of the former marslands (www.edenagain.org).

Israel
Breeding since 1982, gradually increasing to 60 pairs in the Bet Shean Valley in 1998. In 1999 the population increased to 100 pairs. Increasing conflicts with fisheries led the Israel Nature and Parks Authority to start a management program, which involved non-lethal harassment in fall and winter. This resulted in newly established colonies at The Sea of Galilee (Lake Kinneret). In 2000 there were 115-155 breeding pairs in Israel (Nemtzov 2003). The dramatic growth of breeding and especially wintering numbers led to a strong conflict with fisheries and stimulate to start research on the species aimed to develop a MVP model and a management plan in Israel (Ohad Hatzofe *in lit.*).

Italy
The first breeding of Pygmy Cormorants was reported in 1981 in a mixed heronry, located in the natural reserve of Punte Alberete (Ravenna) in the southern Po Delta (Fasola & Barbieri 1981). After more than ten years of absence, in early 1990s breeding was again confirmed for Punte Alberete (Volponi & Emiliani 1995) and suspected for the Lagoon of Venice (Nardo 1994). Since then the breeding population strongly increased in both areas. Preliminary analysis of data collected for the monitoring of colonial waterbirds in the Po Delta Regional Park report more than 600 breeding pairs in 2004 (Volponi 2004). Nowadays, while nesting is still restricted to Punte Alberete and the Lagoon of Venice (Associazione Faunisti Veneti 2004), from late summer to mid winter high numbers are regularly recorded in the central Po Delta where birds disperse after breeding (Borgo et al. 2003). Colour-ringing showed that birds born at Punte Alberete regularly move to the Po Delta and may breed in the Lagoon of Venice. Strangely, up to now, the strong increase of the population has not resulted in settlements in the inland freshwater wetlands of the Po Delta, or the coastal lagoons of the Friuli-Venezia Giulia in the upper Adriatic (max of 46 birds in winter 2002). A further spread of the species may be limited by actions aimed to reduce the impact of piscivorous birds on extensive aquaculture. Illegal shooting and disturbance of breeding colonies has been recorded in aquaculture areas of the Lagoon of Venice and Po Delta where the Pygmy Cormorants are often confused with Great Cormorants *Phalacrocorax carbo* which is claimed to cause heavy damage to traditional extensive aquaculture.

Macedonia
The Pygmy Cormorant once was a numerous breeder at Lake Ochrid and Lake Dojran (Stresemann 1920) but the species became extinct. With the increase in the remaining Balkan populations Lake Dojran was recolonised, with 30-45 pairs breeding in 2001 (Birdlife International 2003). BirdLife International (2004a) estimated 100-150 pairs breeding in Macedonia.

Moldova
First breeding in 1982 along Prut river, increase to 500 pairs (Kunichenko 1991, Crivelli *et al.* 2000). According to Birdlife International (2003) breeding of Pygmy Cormorants is known from the Manta flood-plain-Beleu (probably referring to the same colony in the Prut Valley). BirdLife International (2004a) mentions only 8-12 pairs for the 1990s.

Romania
Crivelli *et al.* 2000 reported breeding Pygmy Cormorants only in the Danube Delta. Puzović *et al.* (1999) however mentioned the existence of a colony on the Romanian bank of the Danube that shifted to the Serbian bank in 1985. Birdlife-International (2003) mentions the existence of two other colonies outside the Danube Delta: in the Parches-Somova wetland (80 pairs in 1999) and at The Little Island of Braila (100 pairs in 1993). The total number in the Danube Delta was estimated to be 4000-7000 breeding pairs in the 1990's (Marinov & Hulea 1996). In 2000 L. Szabo & B. Kiss estimated 4500-5000 pairs present (Capelle & De Smet 2002). A joint Romanian-Ukrainian-Dutch aerial survey revealed the existence of no less than 8311 pairs breeding pairs at 11 sites in the Romanian part of the Danube Delta in 2002 (Platteeuw *et al.* 2003, Platteeuw *et al.* 2004).

Russian Federation
In the Volga Delta 21 breeding pairs were present in the 1980s. The species was not breeding in the Terek Delta (Stoskaya & Krivenko 1988 in Crivelli *et al*. 2000). Cramp *et al.* (1998) mention 150-250 breeding pairs, with a slight increase in numbers. V. Moseikin (*in lit*.) mentioned the existence of large colonies of Pygmy Cormorant in the Volga Delta and the Don Delta. He also listed smaller nesting colonies (with several tens of pairs) in Southern Russian regions: Stavropol (Northern Caucasus), Astrakhan, Kalmykia and Krasnodar. Birdlife International (2003) mention 300 pairs in the Volga Delta in 1995, but do not mention the species for the Don Delta. BirdLife International (2004a) estimated the Russian population to have increased to 2000-5000 pairs in 2000.

In Dagestan, 170 breeding pairs were counted in the 1980's at Achikol lakes (Crivelli *et al.* 2000, Pishvanov & Prilutskaya 1988). Birdlife International (2003) mentioned 20 pairs for Achikol Lakes in 1988 and 15-25 pairs for Agrakhanski Bay in 1997.

Serbia and Montenegro
Breeding in Dubovacki Rit marsh along the Danube river since 1985. This colony was formed by birds that moved from a colony in Romania. In 1998 this colony held 340-360 breeding pairs. In 2001 this colony reduced to 70-100 breeding pairs, but a new colony was established at Mala Vrbica along the Danube river, comprising 200-300 breeding pairs. A small breeding location was found near Baranda, with 3-5 breeding pairs in 2001. There are some indications that small numbers of Pygmy Cormorants may breed in some other wetlands, predominantly in Vojvodina, but proof is still missing. The total estimate for Serbia is 273-405 and 350-500 breeding pairs respectively in 2001 and 2003 (S. Puzović & M. Tucakov *in lit*., Puzović et al, 2003).

In Montenegro breeding in large numbers was reported from Skadarsko Jezero (Lake Skadar), but precise data were absent (Vasić *et al.* 1992). Large number of feeding birds at the lake were believed to breed at the Albanian side of the Lake, and/or along the Bojana river (Grimmet & Jones 1989). In the 1990s a single large colony was located at Crni Žar, a peat island in Lake Skadar near the Albanian border. The number of breeding pairs at this location varied from year to year, with a minimum of 1100 and a maximum of 1600 breeding pairs.

(pers. com. Ondrej Vizi,Vizi 1997). The most recent estimate reaches 1700-2000 pairs (M. Tucakov: D. Saveljić, pers. comm.). In the Bojana/Buna Delta at the Albanian border, in 2003 colonies were found on Paratuk Island (20 pairs) and on Ada Island (125 pairs) (Stumberger & Sackl 2004, Euronatur, M. Schneider-Jacoby pers. comm.). The colony at Ada Island was destroyed by humans during the breeding season. In 1996 a rough estimate of 350 pairs was made for Ada Island, based on counts of birds flying in and out of the colony (Zekhuis & Tempelman 1998).

Slovakia
In 1992 and 1993 2-3 breeding pairs were present at the Senné Fish ponds in Eastern Slovakia (Danko S. 1994). In 1997 nest building of several birds was observed at the same location (J. Driessen; A. Wieland).

Syria
Pygmy Cormorants were reported to be possibly breeding at a single site (Cramp & Simmons 1977). Baumgart (1995) mentions the species to be a rare visitor, possibly breeding near Jarablus close to the Turkish border.

Turkey
The main breeding area's are the Eregli Marshes in central Anatolia (600 pairs), Lake Uluabat (300 pairs, Crivelli *et al.* (2000) mentioned c. 800 pairs for this site), the Sultan Marshes (200 pairs) and Lake Manyas (Kus) (150 pairs). Smaller colonies were found in Lake Iznik (30 pairs), the Aksehir and Eber Lakes (50 pairs), the Hotamis Marshes (25 pairs), and the Bulanik Plains (10 pairs) (Magnin & Yarar 1997). BirdLife International (2004a) estimated the Turkish population to hold 1300-1800 pairs in 2001. The Turkish population should be considered threatened because wetlands are drying out (caused by a long-term drought and water extraction), for example in the Eregli Marshes and the Sultan Marshes.

Turkmenia
Breeding occurred in the 1980s (65 breeding pairs), no data for 1990s (Crivelli *et al*. 2000, Bukreev 1997).

Ukraine
Hagemeijer & Blair (1997) reported a decrease in Ukraine. Crivelli *et al.* (2000) however reports a strongly increasing population. The only known colony, located in the Dniestr Delta, was said to hold 320 pairs in 1999 (Crivelli *et al.* 2000). Rusev & Korzyukov (2003) provide detailed information on the evolution of numbers in 6 colonies holding a total of 1181 breeding pairs in 2000. According to their data the above mentioned Dniestr Delta colony held 315 breeding pairs in 1998 and 550 breeding pairs in 1999. In 2000 this colony had grown to 715 breeding pairs. Platteeuw *et al.* (2004) found 1030 pairs in 2002 at three sites in the Ukrainian part of the Danube Delta, more than doubling the figure found by Rusev & Korzyukov (2003) for this area in 2000.

Uzbekistan
Crivelli *et al*. (2000) mentioned Pygmy Cormorants to occur from time to time in small numbers. The Uzbek Wetland Working Group mentions the species breeding at the Karakyr Lakes near Bukhara (www.nature.uz).

Discussion

The information on the colonies mentioned in this article, although not completely up to date, probably gives a clear image of the situation of the species in the Mediterranean basin as well as in the Black Sea area. In the Black Sea regions the Pygmy Cormorant is undergoing a phase of population and range expansion that has lead the species to colonise new areas in central and western Europe. The situation in the breeding areas around the Caspian Sea however is still unclear. The sum of all maximum estimates of known colonies listed above is 24.353; considerably less than the maximum estimate of the species' breeding population (up to 37,323 breeding pairs in Delany & Scott 2002). This discrepancy can almost fully be accounted to the unknown situation in the Caspian area, with high estimates for Azerbaijan and the Russian Federation but lacking information on the existence of colonies and the number of breeding pairs for many areas. From the point of view of the species' conservation, Birdlife International (2004a) concludes that the key populations in Azerbaijan and Romania were stable or increasing, and the species underwent an overall moderate increase. Consequently, this globally Near Threatened Species - previously assessed as Vulnerable in Europe - is now evaluated as Secure. However, in our opinion, the world population of the species cannot be considered secure, since there is still uncertainty about the status of the populations in the eastern part of its range (cf. Statterfield & Capper 2000).

In medieval times the species was present in Spain (Hernandez-Carrasquilla *et al.* 1999), maybe even in England (Cowless 1981). The current expansion of the species' range in Europe can therefore be considered a re-occupation of the former range. According to Burton (1995) the northwards range extension that occurred since 1980s and has lead Pygmy Cormorants to winter in Lower Austria and to breed in Hungary and Moldova may be related to climate warming and mild winters. Climate amelioration in the 20th centuries has been claimed as a (co)factor for the population increase and range extension of many colonial waterbirds (Burton 1995) which share many ecological needs and are often associated with the Pygmy Cormorant (such as the Great Cormorant, and several species of herons and egrets). As for many other colonial piscivorous waterbirds, the reasons for the geographical expansion and population change of the the Pygmy Cormorant should be viewed in the context of unprecedented landscape and social change during the late 20th century. For example, factors considered in the expansion of the Great Cormorant (*P. c. sinensis*) in Europe included: (i) protective international legislation under 79/409/EEC Directive and several conventions (the Bern Convention on the Conservation of European Wildlife and Natural Habitats, the Bonn Convention on the Conservation of Migratory Species of Wild Animals, the Ramsar Convention on Wetlands of International Importance); (ii) "non limiting food supply" due to water eutrophication, expansion of extensive and intensive aquaculture, restocking of rivers and lakes with hatchery-reared fish; (iii) creation of artificial wetland habitat as a result of gravel and sand extraction and construction of reservoirs; (iv) a reduction in chemical aquatic pollution associated to the recent decline in heavy industry in Eastern and Central Europe (Carss 2003). The Pygmy Cormorant probably profited specifically from the construction of reservoirs in the eastern Mediterranean and increasing water eutrophication. Both of these factors contributed to good feeding conditions for Pygmy Cormorants. In the Danube Delta one of the suspected reasons for the spectacular increase of the population is thought to be the linking of formerly isolated waters to the river, leading to nutrient rich waters in larger areas of the Delta (M. Platteeuw, pers. comm.). The construction of shallow reservoirs (e.g. Kerkini in Greece and Hutovo Blato in Bosnia and Herzegovina) led to the destruction of valuable marshland habitats, but resulted in fish-rich shallow water bodies of considerable size that probably benefits large numbers of Pygmy Cormorants.

Shooting of Pygmy Cormorants and destruction of colonies may have been the most important factor that has caused the decline of the species. In many countries the level at which waterbirds are hunted is still high. The near-absence of the Pygmy Cormorant in Albania illustrates the vulnerability of the species. Regulation of hunting is an important factor for the conservation of the species in for example Montenegro, Iran and Azerbaijan.

The lack of even basic information on the ecology (e.g. food composition) and biology (e.g. age of first breeding, reproduction and survival rates, see Cramp & Simmons 1977 and Del Hoyo 1992), coupled with recent population growth, range expansion and, last but not least, rising conflicts with fish-farmers have drawn new attention to this bird in several countries. Colour-ringing projects and studies on distribution and dispersal have recently started in Bulgaria, Croatia, Hungary, Israel, Italy and Serbia and are planned for Romania. As for other colonial waterbirds, such new studies would greatly benefit from data sharing and exchange of information. With this in mind and further stimulated by the recent formation of a specific working group inside the EU Cost Action 635 Intercafe (http://cost.cordis.lu/src/action_detail.cfm?action=635), we propose the establishment of an international network of researchers dedicated to the Pygmy Cormorant. We hope this network will bring together ornithologists from all countries within the species' range. The network will operate under the umbrella of the IUCN Specialist Group. In line with the scope of the Cormorant Research Group, the network will be aimed to improve the knowledge on the ecology of the Pygmy cormorant by facilitating international collaboration. Data and other information collected by the network will be available for the preparation and update of national and international action and conservation plans.

Among the first activities of the network we announce: (I) the set up of an updated bibliography on the species; (II) the search for published and unpublished data on breeding colony distribution for the creation of a GIS based online database; (III) the co-ordination of a simultaneous census of breeding colonies, to be held at least at European level in the breeding season 2006 simultaneously with the pan-European count of Great Cormorant colonies. To clarify the situation of the Pygmy Cormorant in the Eastern part of its range, the network will contribute to a survey of breeding colonies in the area around the Caspian Sea, seeking collaboration with regional ornithologists and organisations.

To facilitate collaboration and information sharing, a dedicated space will be reserved for the network in the Cormorants internet website (http://web.tiscali.it/sv2001).

Acknowledgements
We would like to thank all ornithologists that have contributed to this article: Martin Schneider-Jacoby, Maarten Platteeuw, Mark Zekhuis, Frank Willlems, Alain Crivelli, Giorgi Darchiashvili, Boris Gabrielian, Elchin Sultanov, Elshad Askerov, Nigar Agayeva, A.Hasanović, D. Kotrosan, S. Obratil, S. Matić, Ivailo Nikolov, Peter Shurilinkov, Tibor Mikuska, Darko Kovačić, V. Dumbović-Ružić, V. Žitko, Dragan Radović, D. Kitonić, Jelena Kralj, P. Szinai, Hugh Jansman, S. Nemtzov, Ohad Hatzofe, L. Szabo, B. Kiss, V. Moseikin, S. Puzović, M. Tucakov, D. Saveljić, Ondrej Vizi, M.E. Sehhati, Hamid Amini, J. Driessen, A. Wieland, René Vos and all forgotten here. We hope you will all contribute to the network.

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Status of Great Cormorant Phalacrocorax carbo in Northern Iran: Population Changes and Ringing Plan

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Abstract
Study on the abundance of wintering Great Cormorants *phalacrocorax carbo* was undertaken from 1999 till 2003 in southern coastal zones of the Caspian Sea. The wintering population in three northern states of Iran, Gilan, Mazandaran and Golestan were counted early February every year and the "Total Count" method was used. This counting was done in about 47 main wintering sites by the Department of Environment of Iran. Results showed a spectacular increase in the Great Cormorant population in Gilan and rapid decline in the Golestan province. In the Mazandaran state there were some variations in the Great Cormorants population. The maximum abundance of Great Cormorants occurred in 2003 in the Mazandaran state presented by 15,000 wintering birds while the minimum abundance was found in Golestan state during 2003 winter where only about 124 birds were observed.

Keywords:
Wintering Great Cormorant, Population changes, Gilan, Mazandaran, Golestan, Iran

Introduction

From 1982 on, mid-winter census have been carried out regularly in all Iranian wetlands and water bodies. The main purpose of wader and water birds counts in Iran is to get basic information of abundance and diversity of waterbirds for wetlands management. Due to the geographic and ecological situation and the occurrence of aquatic ecosystems, the main proportion of waders and waterfowl is found in northern and southern Iran while in central parts of Iran the abundance of waders and water birds is less than in other regions (Frouz 1974). Wetlands in southern coastal zones of the Caspian Sea are choosen as wintering sites by thousands of migratory water birds such as Great Cormorants. The responsible organization for bird counts in Iran is the Department of Environment and local offices in each provinces. In this survey we first get data collected by the Department of environment and the investigated population changes of Great Cormorants in the northern provinces of Iran: Gilan, Mazandaran and Golestan. The main wintering population of Great Cormorants are found in this regions (Rabiee 2002).

Study Sites

Counts were conducted in the main wetlands of the southern coastal zones of the Caspian Sea expanded from the Makhtum Gholi bay to Astara, including the three northern provinces of Iran: Golestan (54˚ 15′ -56˚ 30′ E & 36˚ 15′ – 36˚ 30′ N), Mazandaran (35˚ 47′ – 38˚ 05′ E & 50˚ 34′ – 56˚ 14′ N) and Gilan, located between this two regions (Fig. 1). Annual census is undertaken by the Department of Environment of Iran. The number of sites including these areas were 15, 17 and 25 water bodies, wintering sites respectively.

Figure 1. Location of three northern province of Iran

Recent changes in wintering population

The development of the wintering Great Cormorant population was monitored by annual counts. During 1999-2003, an increasing trend in Great Cormorant numbers was observed in northern Iran. In Mazandaran, Great Cormorant numbers increased since 1999. We found an increasing trend in Gilan from 2000 till 2003. In Golestan, Great Cormorants are less abundant than in other areas and its population decreased in recent years (Fig. 2).

Breeding population

Great Cormorants have colonized some breeding areas in northern Iran. The main breeding colony in this area occurs at the Ramsar site in Mazandaran were about 400-600 pairs breed. Other breeding colonies are located in Abbas Abad and Tavalesh in Gilan, but there is not any report of breeding population in Golestan. Numbers of breeding pairs seem to be affected by human interferences and food stocks and feeding condition in areas around the colonies. Breeding populations in some older colonies declined due to destruction of trees within these colonies. Regarding food availability and nesting places, the colony in Mazandaran provides more favorable situations than other places and breeding success in this colony is obviously higher than other sites (Barati 2003).

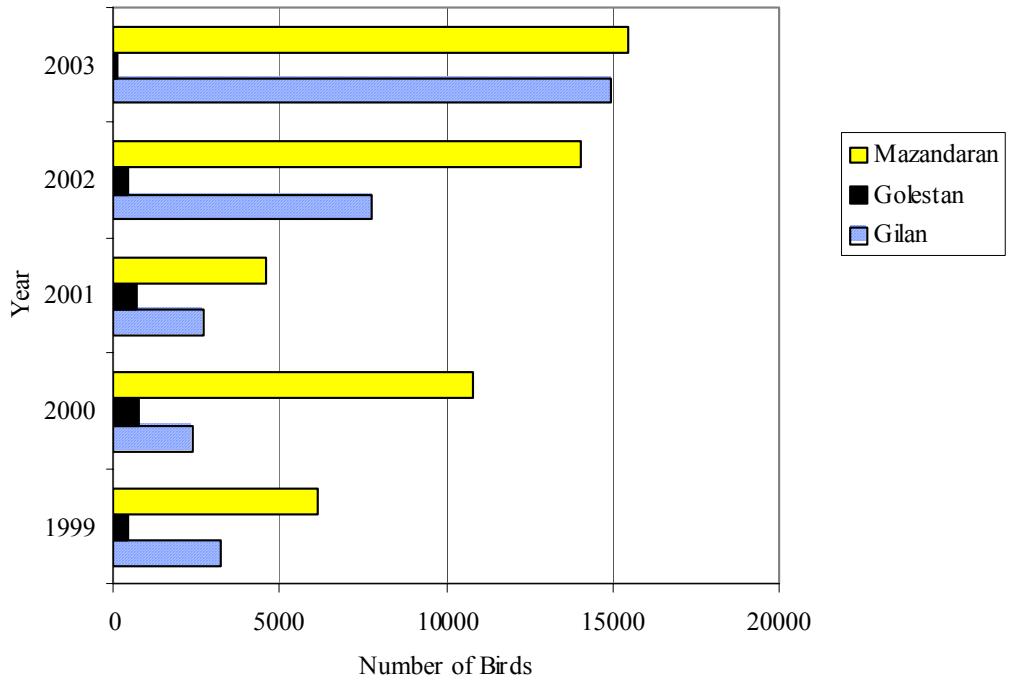

Figure 2. Changes in wintering Great Cormorant numbers in northern provinces of Iran.

Colour Ringing Plan

In order to obtain some information on migration routes of Great Cormorants from Iran, we started a ringing plan using Dutch color rings. In the breeding season of 2003, about 25 post-nestling were ringed and we continue in 2004 with 36 ringed juveniles. All rings were yellow with 2 black numbers. Characteristics of colour rings are summarized in table 1. Ringing was carried out at the main breeding colony in Mazandaran.

Table 1. Ringing information at Ramsar colony

No	Colour	Type	Leg	No.Ringed	year
11-36	Yellow	two numbers	L,R	25	2003
41-75	Yellow	two numbers	L,R	36	2004

Conclusion

Like in many European countries, Great Cormorants have never been protected in Iran. The majority of Great Cormorants winter and breed in the north of Iran due to the availability of the Caspian Sea and many wetlands and aquatic ecosystems and fishing ponds that provides favorable conditions for Great Cormorants. The wintering population size of Great Cormorants is increasing rapidly in northern Iran. Although the impact of Great Cormorants on fish stocks have not been assessed significantly by now, these changes have caused a claim of damage to fisheries in each area. The recent study at the colony in the Ramsar site determined that the diet composition of Great Cormorants mainly consists of *Mugilidae* (45%), *Gobidae* (46%), *Atherinidae* (7%) *and Clupidae* (1%) (Barati 2003). However for the discussion about the impact of Great Cormorants on commercial fisheries, detailed information on diet and feeding ecology is needed. It seems necessary to conduct more detailed information about the situation of Great Cormorants in relation to the commercial fisheries by the Department of Environment or the Department of Fishery. The outcome of such studies then could be used in Great Cormorants management plans in northern Iran.

Ackowledgments

We would like to thank S.van Rijn (coordinator colour ring projects) and M. van Eerden for kindly assist in starting the colour ringing study.

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A REVIEW OF CORMORANTS IN INDIA AND A NOTE ON THE CORMORANT COLONIES IN THE HERONRIES OF THE DELHI ZOO

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Keywords: Indian cormorants, Food, nesting, conservation, economic impacts, Delhi zoo

Introduction

Four species of Cormorants and one Darter are recorded in Indian subcontinent (Ali and Ripley 1983). This list includes the rare vagrant Pygmy Cormorant (*Phalacrocorax pygmaeus)* which is reported only from Pakistan. There are unconfirmed reports of other species also being recorded within Indian limits, for instance the suspected presence of Japanese Cormorant (*Phalacrocorax capillatus*) in Keoladeo Ghana National Park in 1996 (Soni 1997, Deuti 1997). The Pygmy Cormorant and Darter are listed as Near Threatened (BirdLife International 2001). The population figures in Table 1 indicate that the Little Cormorant is the most abundant species in India. While all the species listed are resident within Indian limits, some cross boundary movements are to be expected. This is evident from recoveries of Large Cormorants bearing Chinese rings. The birds were ringed at Quinghai Hu Lake in China, and recovered from two sites in the Indian states of Arunanchal Pradesh and West Bengal (Cormorant News, 2001). The localities are approximately 1200 kms (straight line distance) from the ringing the site.

Review of literature on Indian Cormorants

It appears that few studies have specifically focused on Indian cormorants and scientific information about them is scattered and entrenched in the literature on heronry birds. We briefly review the available information.

Food: The general items recorded in the diet of Indian cormorants are given in Ali & Ripley (1983). Mukherjee (1969) did gut content analysis of cormorants and other aquatic birds found in the Sunderbans delta of Eastern India. An analysis of 297 adult Little Cormorants revealed that the food consumed constitutes commercially valuable fishes (91.09%), amphibians (6.14%), molluscs (1.37%) and crustaceans (0.087%). Prey sizes ranged from 30-120 mm in length. In the case of Darter, a study of 19 individuals revealed its diet to be composed of fishes (81.2%), insects (8.4%), estuarine snakes (7.4%) tadpoles (2%) and crustaceans (1%). Prey sizes ranged from 50mm – 150mm. Another study (Sengupta and Brahmachary 1968) on the food of *Phalacrocorax* (species unspecified) nesting within the premises of Calcutta Zoological Gardens revealed the presence of following fish species in the gut: *Tilapia sp* (67%), carps (27%) and *Channa sp* (6%). An interesting observation made in this study is that very small fishes were found in the crops of young birds- indicating prey-size selection on part of the parent birds. A recent study from the western state of Gujarat has recorded 11 species in the diet of Little Cormorant (Mukherjee and Borad 2001). ***Feeding*** : instances of inter-specific food piracy, such as an attempt by a Pallas's Fish Eagle (*Haliaeetus leucorphys*) to steal a fish caught by a Large Cormorant are recorded (Muir 1916) in Indian ornithological literature. There are also records of Little Cormorants fishing in cooperation with egrets (Panday 1958). ***Nesting***: An analysis of the distribution of various colonial water birds reveals that the Little Cormorant is the most widespread nesting species in India while other species have a partly restricted distribution (Subramanya 1996). In India, cormorants

mostly breed in mixed colonies which exist both inside the protected areas as well as outside them - on trees planted in middle of, or around the margins of village ponds, irrigation tanks and even in city gardens and parks. A case in point is the heronries of the Delhi zoo which are discussed later. ***Nesting period*:** There are considerable variations in the nesting time of cormorants in different parts of the country (Ali & Ripley (1983) Figure 1). This pattern is interesting and begs further questions, such as (1) What are the patterns of resource partitioning among different species of cormorants coexisting in space and time ? (2) How is the nesting time correlated to the availability of food resources in different parts of the country, given that the food (principally fish) is itself dependent upon patterns of monsoonal rainfall throughout the country? (3) What factors besides food availability (say inter-specific competition) can account for the observed variations in nesting period ? ***Conservation***: The problems relating to the conservation of this group of birds are not very different from those of other heronry birds of India. Being a concentration of breeding effort in space and time, cormorant colonies are under threat. Their feeding habitats, wetlands are also threatened in India and in some parts poaching is also reported (Yahya 1995). Being piscivorous, it is likely that there would be a concentration of pesticides residues in cormorants, traveling through the food chains, and this is an area that merits attention. However, during our literature survey we were unable to locate any specific studies on Indian cormorants in this regard. ***Economic impacts***: The fertilizing properties of the droppings of heronry birds have been known since antiquity. One of the earliest reference about this aspect available in literature is in the records of British naturalists in the early years of the 20th Century. For instance Bates writing in 1931 (Bates 1931) about the colonies of cormorants and other heronry birds at Vedanthangal in South India says, "*…I fear me a love of bird –life does not enter into the picture: the reason is purely a mercenary one. Owing to the water of the tank being considered to possess high fertilizing properties, the value of the land irrigated by it is assessed for revenue purposes at a higher rate than other land in the vicinity*". A recent study has attempted to study the effects of cormorants and some other aquatic birds on the eutrophication of freshwater reservoirs in Gujarat state (Mukherjee and Borad 2001). In many parts of the world cormorants are regarded as pest in commercial fishery (Wywialowski 1999) or used for catching fish (Erling Hoh 1998). Some general information exists about the damage caused by cormorants to fish fry in culture ponds (Ali and Ripley 1983). There are reports of Darter being used for capturing fishes by some communities in the North – Eastern state of Assam (Stonor, 1948). This is interesting because in China it is generally cormorants that are used for fishing and not Darter.

Cormorant colonies in the Delhi Zoo

There is considerable scope for field research on the ecology and conservation of cormorants in India. At the University of Delhi we have initiated a research program to study their field ecology in the Delhi region in which we intend to focus on a permanent cormorant colony in the Delhi Zoo. The zoo is located on the western bank of the river Yamuna, passing through the city. Large numbers of Painted Stork *Mycteria leucocephala* (300-500 each year depending upon monsoon rains) have been nesting here since 1960 along with other species, such as Indian Pond Heron *Ardeola grayii*, Cattle Egret *Bubulcus ibis*, Intermediate Egret *Mesophoyx intermedia*, Little Egret *Egretta garzetta*, Black- crowned Night Heron *Nycticorax nycticorax* and Black-headed Ibis *Threskiorns melanocephalus* including Little Cormorant and Indian Cormorant. Details about the colonies are given in Urfi (1996). Principally the colonial waterbirds nest on islands planted with *Prosopis juliflora* (with merged canopies) in three separate, but interconnected, concrete lined ponds of the zoo. All the heronry birds nesting in these ponds are free ranging and fly in and out of the zoo to gather food from the wetlands and marshes associated with the Yamuna , laying 1-2 km away.

Since 2004 we have initiated studies to understand the daily movements of the cormorants in and out of the zoo premises and study the patterns of seasonal build up in their populations. We are also studying some aspects of their nesting ecology such as nest site selection, variations in clutch size and nesting success. As a part of this research program we also intend to investigate the status of cormorants in the Delhi region and their conservation threats. Comments and suggestions from the readers would be welcomed.

Acknowledgements
AJU wishes to acknowledge the grant of a research project from the Ministry of Environment and Forests, Government of India, to study the ecology of heronry birds in the Delhi region. MM acknowledges University Grant's Commission, India for the award of a junior research fellowship.

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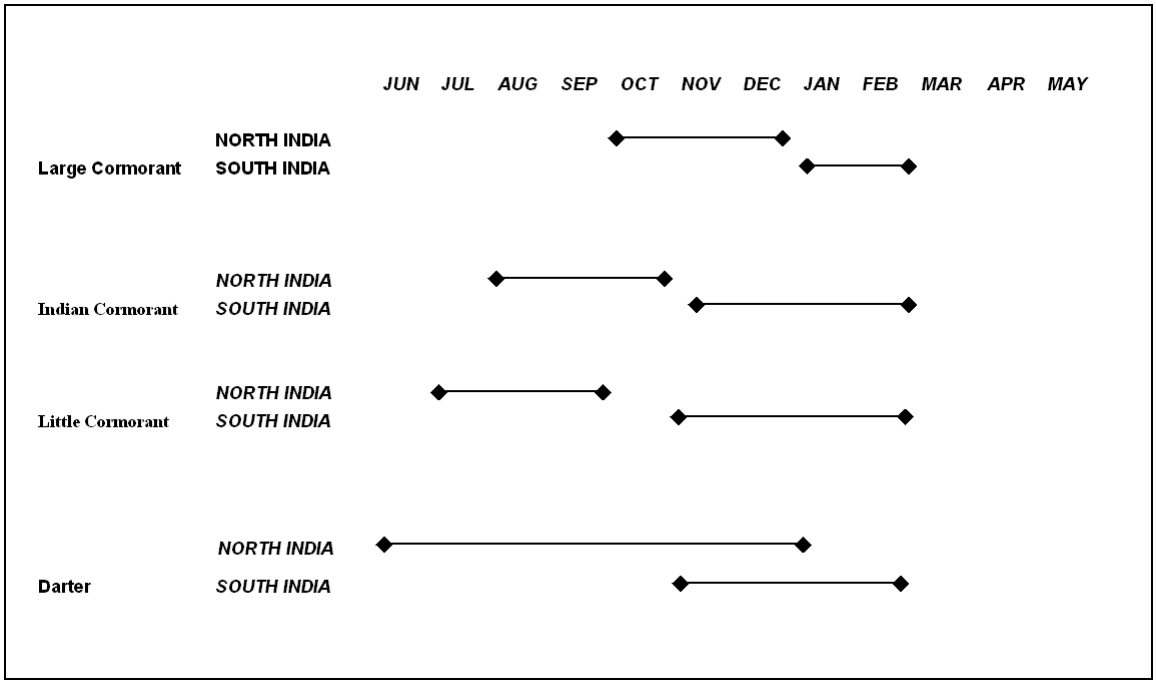

Figure 1. Breeding seasons of Cormorants and Darter in the Indian Subcontinent (Ali and Ripley 1983)

Table 1. Cormorants and Darter counted during the Asian Waterfowl Census across India. Note: Since the count effort (in terms of sites covered and number of volunteers involved) in the AWC program is highly variable, any deduction of abundance trends from this data would

not be meaningful. At best the above figures can serve to provide some idea about relative abundances of the different species. . *Source*: *, Lopez and Mundkur (1997) ; †, Li and Mundkur (2004).

Species	Numbers counted in different years							
	1994*	1995*	1996*	1997†	1998†	1999†	2000†	2001†
Darter *Anhinga rufa*	1316	814	807	204	44	449	203	617
Little Cormorant *Phalacrocorax niger*	56702	36195	43395	1463	3390	7520	2122	27538
Indian Cormorant *Phalacrocorax fusicollis*	5165	3655	4968	604	680	1388	39	3307
Large Cormorant *Phalacrocorax carbo*	6674	10563	8233	244	826	2871	153	12516

Italian counts of wintering Great Cormorants (Phalacrocorax carbo) at the turn of the millenium

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A reassessment of the winter population size of the Great Cormorant was carried out in Italy in the course of four seasons, from 1997-98 to 2000-01, thanks to specific funding by Ministero delle Risorse Agricole, Alimentari e Forestali. Night roosts (n= 95-169) were counted at three dates per winter (early Dec., mid Jan., early Mar.) by 211 project participants. The results obtained by this type of activity had to be integrated by replacing the gaps of coverage with inputed data derived by either roost-counts on the closest available dates, or day-time presence during the IWC January counts. A general estimate of the population size was attempted only for January and ranged from 49,933 inds (Jan. 98) to 63,796 inds (Jan. 00), distributed in 298-305 night roosts and 453-622 feeding sites (i.e. different IWC count units). Roost-counts represented 48-56% of these figures. Between the first and last counted winter a mean 6.5% yearly increase rate was observed basing on estimated totals, whereas the corresponding value calculated from the 83 best-counted roosts (hosting 43% of the estimated mean population) was 5.2%. Nearly 50% of the population occurred at sites less than 10 km far from the sea, 35% at 10-100 km from the sea and 15% further inland. Habitat types were coastal lagoons and estuaries (46%), inland lakes (32%), low river-courses (15%), sea (5%), high river-courses (2%), with roosts placed on trees (72%), saltmarshes (11%), emergent poles (9%), rocks (5%) and others (3%). The mean roost size was 249 and the mean flock size at daytime counts 70. Daily commuting between roosts and feeding sites located on different IWC count units was shown by 70% of the population, with 36% performing movements of less than 5 km, 29% 5-10 km, 31% 10-20 km, 4% >20 km (distances were calculated between the midpoints of each wetland, not between actual bird positions).

The described situation differs from the past in several aspects. Although the increase rate has much decreased since the previous decade, cormorants are now more difficult to be monitored as a result of their broader distribution (see figure 1, Baccetti et al. 2002), Biol. Cons. Fauna 111 - and larger number of (often small) roosts, what obviously reflects on data quality and completeness. The increasing trend in the occupation of inland sites is continuing, and it is just at the latter that there are still obvious increases in numbers.

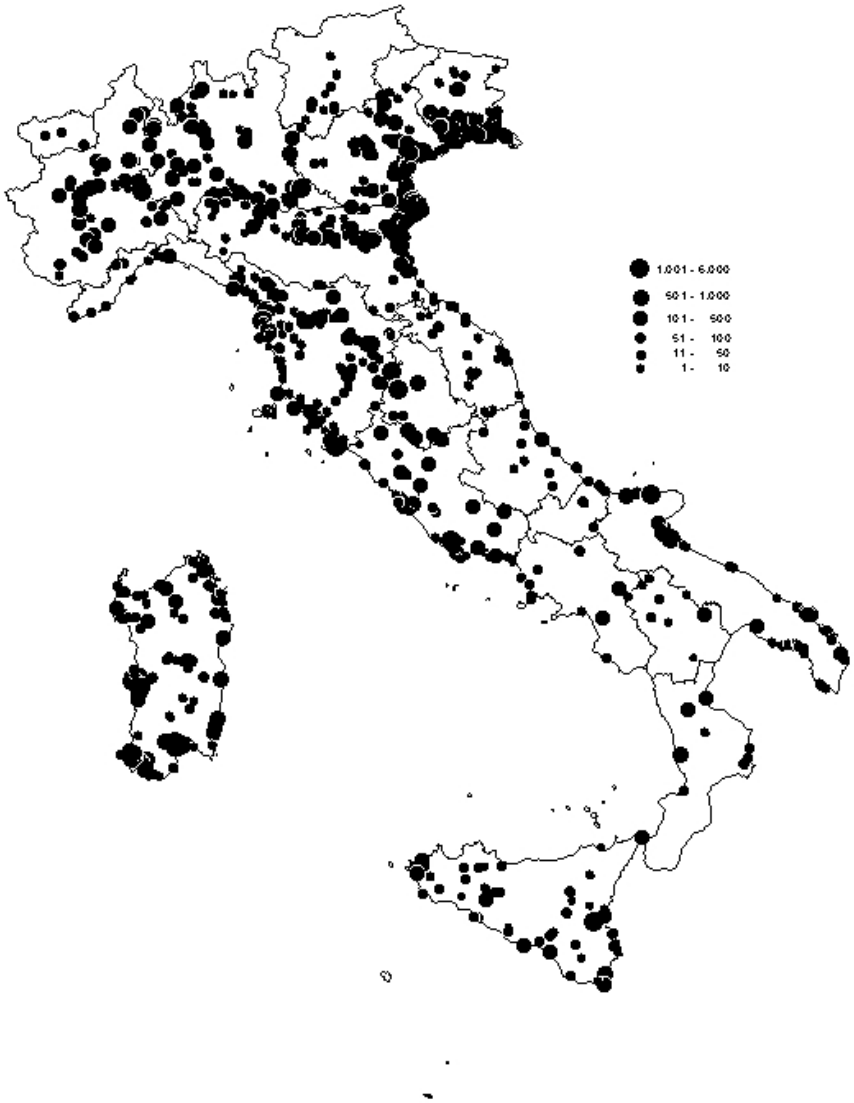

Figure 1. Winter distribution of Cormorants Phalacrocrax carbo in Italy (from Baccetti et al. 2002)

References

Baccetti et al. 2002, Biol. Cons. Fauna 111

WINTERING CORMORANTS IN LIBYA

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From 3 to 17 January 2005 we counted wintering waterbirds and investigated the possibility of Slender-billed Curlew (*Numenius tenuirostris*) occurring at the majority of coastal wetlands in Libya, in the course of a survey promoted and sponsored by UNEP's Mediterranean Action Plan (Action Plan for Birds, RAC/SPA, Tunis) and the Afro-Eurasian Waterbird Agreement under the Convention on Migratory Species, in cooperation with EGA, Libyan Environment General Authority. A total of almost 30,000 waterbirds was censused on about 60 wetlands, located along 1800 km of coast from the Tunisian border to Tobruk (plus a few inland sites). We report here on Great Cormorant *Phalacrocorax carbo*, a species that had been previously recorded from this country only in single figures (Bundy 1976, Brehme et al. 2002), even though it was known to occur in huge flocks very close to the borders of Libya (Gloe 1992). No Mediterranean Shags *Phalacrocorax aristotelis desmarestii* were recorded during our survey, though this species was found nesting in small numbers in eastern Libya (Meininger et al. 1994).

Not surprisingly perhaps, Libya turns now out to hold some relatively large flocks. It is definitely not, however, a major country for Great Cormorant: at 26 sites where the species was observed, we counted a total of 1159 individuals. This cannot be considered a complete figure, mainly because our activities were not specifically aimed at this species. We did not visit night roosts, where larger figures might be expected, and we only occasionally monitored marine coastal waters. Nevertheless, the fact that the commonest local wetland type (shallow saline depressions – "sebkhas") is unsuitable for diving birds, and that there are few lagoons or shallow marine waters, make it very unlikely that we overlooked important cormorant concentrations. Flooding of sebkhas was later than usual in the season monitored, what might have contributed to determine unfavourable trophic conditions.

The western coast - Farwa Lagoon and nearby Gataya island, only 10 km from the Tunisian border, held the largest numbers in the country (494 birds); shallow marine waters (the 10m depth contour line falls at 4-8 km from the shore) and marked tidal movements are the outstanding features of this westernmost part of the Libyan coastline. For the rest of this coastal strip, up to the town of Misrata, we found in total only 23 birds at small river estuaries and in Tripoli Harbour, with 3 additional birds well inland at the Wadi Zaret reservoir in the foothills of the Jebel Nafusa. A previous max. count of 506 individuals was made at Farwa Lagoon in winter 1999 (Etayeb 2001).

The Gulf of Sirt – This huge gulf, whose bathymetry is probably favourable for cormorants and which has islets that could be used as night roosts, was not fully monitored. Coastal sebkhas surrounding it, however, are unsuitable for cormorants. The immense lagoon that bordered the western Sirt coast, hosting safe harbours in ancient Greek times and well known to the geographer Strabon, has long turned into an equally huge complex of mudflats and saltmarshes (Sebkhat Tawargha, over 2000 km^2). We observed only 12 Great Cormorants across this whole area.

The eastern coast – Here the coast is mainly rocky, starting with a hotspot for Great Cormorant around the city of Benghazi (281 birds, with main day-roosts of 168 in the Bou Dzira recreation pond, 43 at Ain Azziana Lagoon, 30 on Benghazi Lake and Harbour, and at least 40 more leaving the harbour area at sunrise and heading south of Garyunes along the coast). East of this area, only 22 birds were seen at 5 sites, followed by another hotspot in the shallow Gulf of Bomba (249 birds, with main feeding areas at Sebkhet Temimi and the inlet of Ain el Ghazala Cove, a night roost on the island of Jeziret al Elba) and a group of 62 in Tobrouk natural harbour.

Cormorants in the desert – To our surprise, 13 Great Cormorants constituted almost all the waterbirds present on Melfa Lake, close to Jaghbub Oasis, 300 km into the desert south of Tobrouk. This brackish lake, hosting a typical marine relict fauna (from mussels and cockles to killifish, sandsmelts and gobies), also held introduced tilapias that probably supported the cormorant flock. Most birds were in adult plumage, which suggests that a chance arrival of inexperienced migrants was not the reason for their presence.

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Status of wintering and breeding populations of Great Cormorants Phalacrocorax carbo sinensis in Switzerland

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Abstract
Following a dramatic increase until the early 1990s, the wintering population of Great Cormorants in Switzerland decreased and stabilised at 5000 to 6000 individuals at the turn of the century. During the roost count in January 2003, carried out as part of the coordinated European census organised by the Wetlands International Cormorant Research Group, 4201 Cormorants were counted in Switzerland, 5885 if the roosts across the borders to adjacent countries are included. Overall, 60 occupied roosts were found, 46 of which were in Switzerland. Cormorants established their first breeding colony in 2001 on an island in the Fanel waterbird reserve, Lake Neuchâtel. From 2 pairs in 2001, numbers increased to 53 certain broods in 2004.

Introduction
The strong increase and the development of Great Cormorant breeding colonies is well documented in many European countries. On the other hand, information about the actual situation of the wintering population of Great Cormorants in Europe is incomplete. The Wetlands International Cormorant Research Group therefore organised a coordinated census of Great Cormorants across Europe in order to get an overview on population size, migration patterns and distribution of Great Cormorants in winter. This report presents the results of this roost census in January 2003 for Switzerland and gives an overview on the development of the wintering population as well as the recently established breeding population.

Methods
In Switzerland, counting Cormorants has a long tradition. Great Cormorants were included in the national waterbird census from its start in 1967. However, a combination of methods was used. While some people counted Cormorants during daytime, others made a separate count at night roosts. These differences could largely be eliminated by a careful analysis of the data for the publications on population size and trend of Cormorants in Switzerland (Suter 1989, Pedroli & Zaugg 1995). Since 1996, daytime counts and counts at night roosts can be indicated separately on recording forms, which largely eliminates double counts. In addition, Great Cormorants were counted at night roosts in a separate programme supported financially by the Federal Agency for the Environment, Forests and Landscape FAEFL. This programme covered the winters 1995/96 to 2000/01 and incorporated in each winter a count in mid-November and one in mid-January. A summary of the situation of Great Cormorants was compiled in a fact sheet (Burkhardt et al. 2002a, Burkhardt et al. 2002b) and a more detailed analysis of the development of the wintering population is in preparation (Schifferli et al. in prep.). The European Cormorant census in January 2003 was organised by the coordinators of the Swiss national waterbird census at the Swiss Ornithological Institute in Sempach, V. Keller and M. Burkhardt. It was coordinated with the waterbird census in mid-January, which was carried out on the weekend of 11/12 January 2003.
The size of the only breeding colony of Great Cormorants is monitored by local ornithologists who carry out nest counts (J. Hassler, P. Mosimann, P. Rapin, M. Antoniazza and others).

Results and discussion

Wintering population

At the roost count in January 2003, 4201 Cormorants were counted in Switzerland, 5885 if the roosts across the borders to Germany, Austria, Liechtenstein, Italy and France are included (Table 1; details in Keller & Burkhardt 2003). Overall, 60 occupied roosts were found, 46 of which were in Switzerland. Observers indicated an additional eight roosts which on the count date were not occupied. Around two thirds of the roosts, holding 78% of Cormorants, were situated on lakes, one third (22% of birds) on rivers. Islands are generally rare on Swiss lakes and rivers. It is therefore striking how many roosts were found on islands (Keller & Burkhardt 2003). The Cormorant is widespread on the Swiss Plateau north of the Alps, while south of the Alpine chain roosts were found only on the two large lakes Verbano/Lago Maggiore and Ceresio/Lago di Lugano (Fig. 1). Most lakes, also very large ones like Lake Neuchâtel or Bielersee, had only one roost. The maximum number of roosts was four, on Bodensee-Untersee. The largest roost, Les Grangettes on Lake Geneva, held 984 cormorants (Table 2). This has always been the largest roost, with a maximum number of 5300 recorded in November 1991. The maximum number in January was 2250 in 1992. Two other roosts held more than 500 Cormorants: Lac de Morat and Crotti/Ramponio I close to the Italian/Swiss border near Gandria on Ceresio/Lago di Lugano.

Cormorant numbers in Switzerland increased strongly until the early 1990s (maximum number in January 8415 individuals in 1992, roosts across the borders included; Fig. 2). Subsequently numbers dropped and stabilized between 5000 and 6000 birds in the last few years.

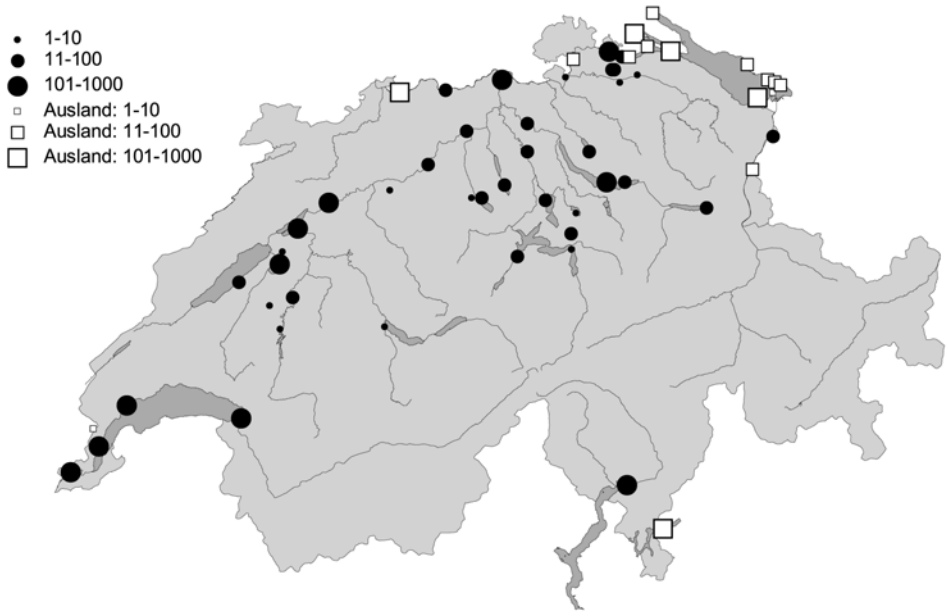

Fig. 1. Distribution of Great Cormorant roosts in Switzerland in January 2003. "Ausland": Roosts outside Swiss territory.

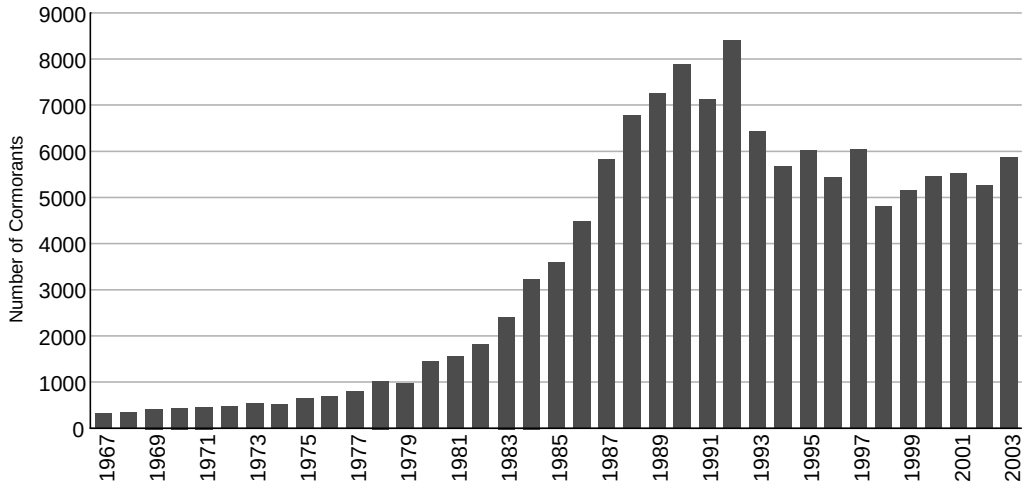

Fig. 2. Numbers of Great Cormorants in January for Switzerland, roosts across the borders included (Pedroli & Zaugg 1995; Burkhardt et al. 2002a,b, updated).

Breeding population

In 2001, the first Great Cormorants of wild origin nested on Lake Neuchâtel (Rapin 2003). In the following years, numbers increased rapidly: 2001: 2 confirmed broods, 2002: 7, 2003: 23, 2004: 53. In 2004, the 53 pairs raised 98 young (Archive Swiss Ornithological Institute). The colony is situated on two small artificial islands in the waterbird reserve Fanel. Nesting takes place on the ground. The islands also host over 600 breeding pairs of Yellow-legged Gulls (*Larus cachinnans michahellis*). Starting in 2005, Great Cormorant chicks will be colour-ringed (year cohorts) in addition to the metal rings already applied in the last years. The ringing programme, which will be coordinated by P. Mosimann, should provide the basis to establish the origin of birds in case other breeding colonies in Switzerland will be established.

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Acknowledgements
We thank the volunteer observers who participated in the census, J. Hassler, P. Mosimann, M. Antoniazza and P. Rapin for monitoring the breeding colony, and the Swiss Agency for the Environment, Forests and Landscape SAEFL for financial support.

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First Pan-European Cormorant midwinter census - January 2003

Preliminary results

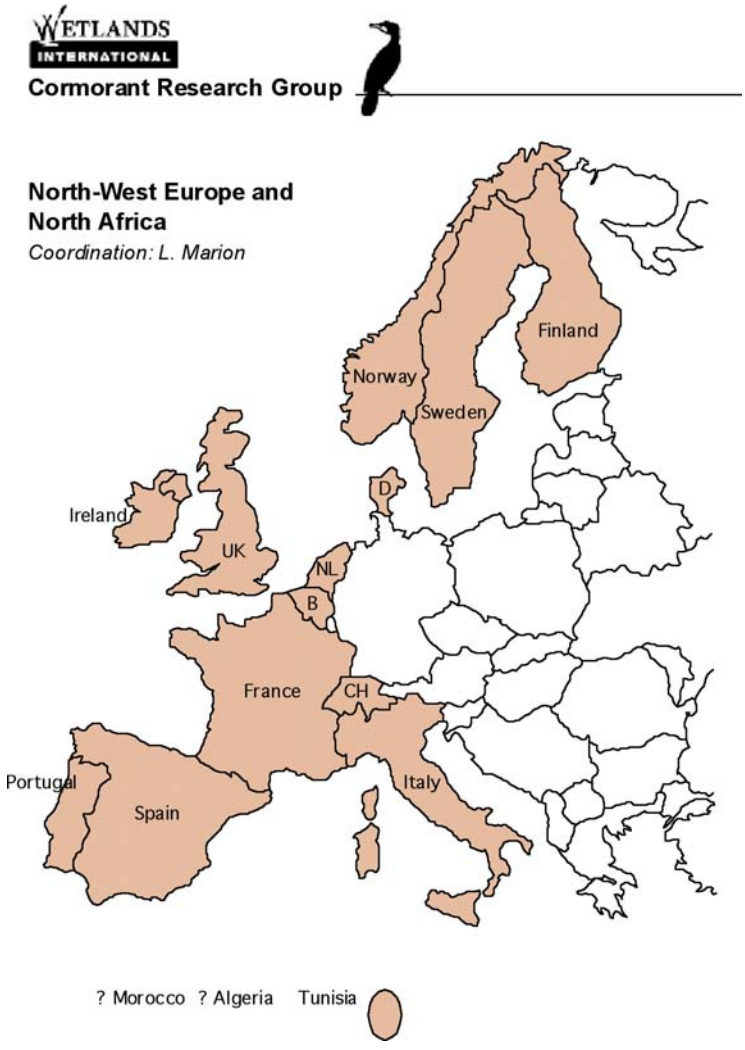
Rosemarie Parz-Gollner

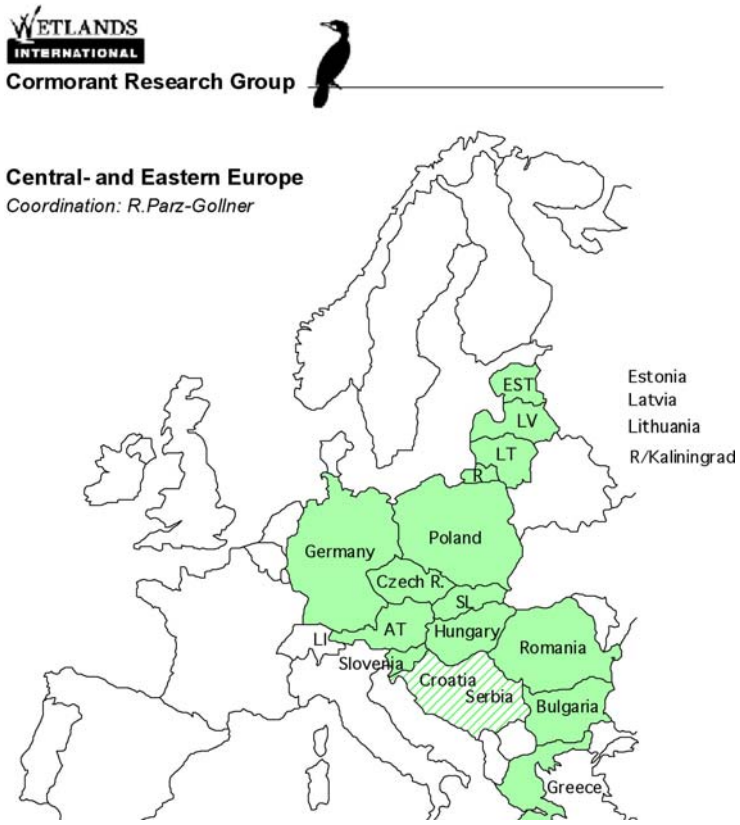
The goal

The aim of the first pan European midwinter census was to get a picture about the actual population size, migration pattern and distribution of cormorants wintering in Europe as complete as possible. To reach that goal the international cormorant research group took advantage of the experience of people joining the long existing international water bird-census-network as volunteers in many European countries.
The plan was to count all known cormorant night roosts (inland and sea coasts) in all European countries and North Africa simultaneously in mid January 2003. (ref. to text leaflet one)

Method

Two European coordinators were nominated to organize the count:
Responsible for EU - west and north, northern Africa: Loic Marion
Responsible for EU - central and east: Rosemarie Parz-Gollner





The European coordinators tried to find partners who were taking over the national coordination in all relevant countries participating in that project. These partners (national coordinators) were responsible for the data collection on a national level and for the feed back of the results to the European coordinators. Counting teams doing the field work were organized on a national level by the national coordinators.

Two leaflets as well as protocols for the data collection were distributed via the European coordinators to explain and describe the project and to provide all people involved with the relevant information about the data collection (ref. to text leaflet one, leaflet two). Already existing counting schemes in various countries were continued or were adapted in accordance to the guidelines following the common goal to collect Cormorant numbers on roost sites. Both European coordinators kept contact with their national partners, tried to give support and help in solving questions whenever needed and are responsible for the final European wide data synthesis. It was in the responsibility of the national coordinators to decide about the final numbers, the status and the accuracy of the counts on a national level.

Results

38 countries (regions) were listed and have been involved in this project (ref. Tab.1).
For the final data synthesis at least three countries will be treated separately:
Ireland, Norway – wintering populations consists of Ph. carbo carbo species only;
Israel – wintering population does not belong to European population, exchange with Ukraine.
For 21 countries final results have been calculated (completely or partly counted plus best estimates); 14 countries /regions are still under revision, further sources of information are checked to improve the data quality.

Data compilation will be finalized and published in the name of the Cormorant Specialist Group of Wetlands International as soon as all final corrections are completed.

Tab.1. List of countries and status of data collection (July 2005)

No	**country**	**status**	**remarks**
1	Albania	rough estimate/numbers not available	*revision*
2	Austria	completely counted	final result
3	Belgium /south, Belgium north	partly counted + estimate, in progress	*revision*
4	Bosnia Herz.	rough estimate/ numbers not available	*revision*
5	Bulgaria	partly counted + best estimate	final result
6	Croatia	rough estimate/ numbers not available	*revision*
7	Czech Republic	partly counted + best estimate	final result
8	Denmark	estimate - in progress	*revision*
9	Estonia	completely counted	final result
10	Finland	counted	final result
11	France	completely counted	final result (incl. carbo)
12	Germany	completely counted	final result
13	Great Britain	counted + best estimate	final result (incl. carbo)
14	Greece	completely counted	final result
15	Hungary	completely counted	final result
16	Ireland	best estimate	*carbo*
17	Israel	completely counted	*Pop. out of Europe*
18	Italy	best estimate	final result
19	Latvia	completely counted	final result
20	Liechtenstein	completely counted	final result
21	Lithuania	partly counted + estimate	final result
22	Luxemburg	estimate - in progress	*revision*
23	Montenegro	rough estimate/numbers not available	*revision*
24	Netherlands	final results - best estimate	final result
25	northern Africa (Morocco, Libya)	rough estimate/ numbers not available - in progress	*revision*
26	northern Africa (Tunisia, Algeria)	rough estimate/ numbers not available - in progress	*revision*
27	Norway	rough estimate - in progress	*revision (carbo)*
28	Poland	completely counted	final result
29	Portugal	rough estimate - in progress	*revision (incl. carbo)*
30	Romania	partly counted + rough estimate	final result
31	Russia / Kaliningrad	partly counted + best estimate	final result
32	Serbia	rough estimate/ numbers not available	*revision*
33	Slovakia	partly counted + rough estimate	*revision*
34	Slovenia	completely counted	final result
35	Spain	completely counted	final result
36	Sweden (south)	rough estimate - in progress	*revision*
37	Switzerland	completely counted	final result
38	Turkey (partly, western area)	no estimate so far - in progress	*revision*

Reproductive Performance in Great Cormorants at Ramsar Colony, Northern Iran

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Summary
Northern provinces of Iran provide suitable situations for wintering and breeding Great Cormorants due to occurrence of many wetlands and water bodies in this regions. Great Cormorants are dependent on marine and freshwater wetlands, and are top-predators in the ecological food-web and thus particularly exposed to habitat loss, pollution and other human activities affecting such habitats. As a M.Sc thesis we started a study on the breeding status of Great Cormorants at a Ramsar colony during the breeding season of 2003. This breeding population have been defined since at least 1993 and is located in the Mazandaran province (35° 54´ N , 50° 40´E). During the breeding season, this colony was visited at least twice a week, to collect data. Factors influencing breeding success and Daily Survival Rate were studied. We used Mayfield and Maximum Likelihood methods to estimate nest survival during incubation and nestling stages. Mean brood size was 3.03 and early-breeder pairs had significantly larger broods. A positive relationship found between nest size and both brood size and number of chicks fledged. Breeding success was 2.88 per nesting attempts (80% of initial eggs). The difference in reproductive success between early and late breeders was not significant. There were higher Daily Survival Rates in later stages of chick rearing than the incubation stage and main losses occurred in incubation stages. Results suggest that the Ramsar colony site provide more favorable situations for breeding Great Cormorants´ than other studied colonies due to special factors influencing the birds in this colony:

1) Temporal and spatial availability of food resources and the distance between nesting and feeding areas since the colony is located next to the Caspian sea.
2) There are limitations in human interference in this colony.
3) Natural predators effects on nests and eggs are avoidable in this breeding site.

Keywords:
Great Cormorant, *Phalacrocorax carbo*, Breeding Success, Daily Survival Rate, Ramsar

PREFERABLE HABITATS OF THE Phalacrocorax brasilianus (GMELIN, 1789) BEING CONSIDERED, MARINE AND RIVER WATER ENVIRONMENTS

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The Neotropic Cormorant is a coastal-aquatic, deep water, large bird that inhabits both sea and river environment. They are distributed worldwide (Sick, 1996). They gather in colonies, often with herons, spoonbills and seagulls (Höfling & Camargo, 1999). They basically eat fish, but can also be seen eating small amphibians, reptiles and crustaceans (Gough, 1999).
This study was carried out from June 2000 to May 2001 and from June 2000 to October 2001 during the day light period on the "Ilha do Rato" (Bay of Guaratuba) and in the Municipal Parks of Barigüi and São Lourenço in the city of Curitiba.
It was aimed to observe the options that these birds have as a habitat. The possible habitats were divided into trees (branches), water and soil (sand). The criteria used to divide such sections were the observations accomplished previously in the study areas, verifying the preferable and available places for the behavioral activities of the Neotropic Cormorant.
The behavioral categories which were observed in these habitats were maintenance, agonistic and feeding. The *Phalacrocorax brasilianus* in marine and river water environments, executed 77,9% (N=832) of their activities on the branches of the trees; 13,2% (N=832) in water and 8,9% (N=832) on the soil. The branches were used in a larger frequency, because it was on these places that the birds triggered all of the maintenance activities while water was more frequently used for foraging and feeding. The soil was less frequently used because the sandbanks in the Bay of Guaratuba (places where sandbanks appear when the tide is very low) were not so frequently observed and in the parks the available soil was invaded by low vegetation. Another possibility for the small soil frequency is the difficult locomotion that the Neotropic Cormorant has (Höfling & Camargo, 1999). Therefore, although it is considered as an aquatic bird, the Neotropic Cormorant doesn't spend much time in the water but actually on tree branches.

Ring Studies

A new colour-ringing project of Great Cormorant (*Phalacrocorax carbo*) in Wallonia (Southern Belgium)

The Great Cormorant first bred in Wallonia in 1992, as a consequence of the northwest European Cormorant population large expansion. A second colony was established in 1994. Until now, the initial high growth rate of these two colonies did not lead to the expected establishment of new satellite colonies in the region.
A detailed study of the two colonies indicated a high production rate of 2,7 fledglings per nest, at least for the 1999 breeding season (Jenard, 1999). If this high production rate is a constant every year, a large excess of adults (> 3 year-old) is produced in these colonies since at least 1997. This excess of potential breeders is far from being absorbed by the continuous but moderated local increase in the breeding pair numbers. These potential breeders may then constitute a floating population in the area, or emigrate to other breeding areas like the nearby Flanders, where the Cormorant population is slowly but continuously increasing since 1993 (Devos, 2004). Alternatively, the survival or site-fidelity in this Cormorant population could be lower than normal. To test these hypotheses, a new colour-ringing scheme is scheduled to begin in 2005. This project will be led by Aves (Belgian bird study and protection society), in collaboration with local bird ringers and the Biological Research Centre of Harchies.
Only the Hensies colony nests could be reached safely for ringing purpose. Disturbance of this mixed-species colony should be minimised, so few nestlings will probably be ringed every year.
The rings in used for this program come from Stef van Rijn (European co-ordinator for Cormorant colour-ring schemes) and will be green with a white three-letter code beginning by "K".
All inquiries or observations could be sent to Jean-Yves Paquet, Rue du Blacet, 1, B-5530 Yvoir, Belgium, + 32 82 61 54 68 (jeanyves.paquet8@yucom.be).

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CURRENT COLOUR-RINGING PROJECTS ON CORMORANTS IN THE UK

Richard Clarke, Alan Lauder, Rob Field & Stuart Newson

There are currently four ongoing colour-ringing projects on Great Cormorants in the UK.

Colour-ringing on Denny Island, Monmouthshire, Wales

The first of these projects coordinated by Richard Clarke and Goldcliff Ringing Group focuses on the ringing of coastal breeding *P. c. carbo* at a relatively new colony established on Denny Island, Monmouthshire, Wales (51°32'N, -2°48'W). Denny Island, which is only 100 by 50 meters in size, is the only island off the Monmouthshire coast and lies in the Bristol Channel mid-way between Wales and England. Based on the number of used nests recorded over the past five years, the number of breeding pairs of cormorants on the island fluctuates between 60 and 90 pairs. In addition to Great Cormorants, other breeding species on the island include Great Black-backed Gulls *Larus marinus*, and up to 2001, Herring Gulls *Larus argentatus*.

Following an initial visit to Denny Island by Goldcliff Ringing Group in 2000, it was decided that from 2001 the group would undertake an initial 5-year colour-ringing study of Great Cormorants with the following aims:

- To monitor annual change in the numbers and breeding performance of cormorants
- To determine feeding areas and establish post-fledging dispersal patterns

To date over 230 cormorants have been colour-ringed for which green rings with 3-letter white combinations on the right leg have been used. Recoveries and resightings of colour-ringed birds are providing insight into post-fledging dispersal, and the importance of particular wintering areas for this colony are starting to emerge. There are plans to publish some of these findings shortly.

Further information on the project can be found at http://www.gwentbirds.org.uk/. Also an interim report has been produced on the project (Clarke, R. 2002).

Colour-ringing in Scotland

Coordinated by Alan Lauder, this project focuses on colour-ringing at a number of *P. c. carbo* coastal colonies in Scotland, including colonies in Argyll, Caithness, Sutherland, Firth of Forth and Dumfries & Galloway and Shetland. The main aim of the project is to:

- Examine the impact of cormorants on a commercial sport fishery at Loch Leven, Perth & Kinross, Scotland.

A history of cormorant culling at this site meant that previous ringing recoveries were available to examine the origins of birds occurring there in winter. However, a subsequent substantial increase in the wintering population and a reduction in culling meant that up to date information on the origins of birds were not readily available when this study started. In

order to obtain such information, colour-rings were distributed to selected cormorant ringers throughout Scotland and young birds fitted with rings in order to determine the areas contributing to the wintering population at Loch Leven.

Since 1998 about 850 cormorants have been colour-ringed in Scotland as part of this project with white rings, 3-letter green combinations. Whilst the formal project ended in 2001, a small number of birds continue to be colour-ringed each year. Analyses and reporting of these data will be carried out shortly.

Colour-ringing at the mixed *P. c. sinensis* / *P. c. carbo* colony of Abberton Reservoir, Essex

Since 1990, Graham Ekins has colour-ringed 150 young a year at Abberton Reservoir in Essex, England (51°45'N, 0°45'E). This makes this the longest running colour-ringing project on inland tree-nesting cormorants in the UK. In all years, orange rings with white or black 1-3 digit combinations have been used.

Breeding at Abberton Reservoir first occurred as recently as 1981 with 9 pairs, although the colony quickly grew to a maximum of 551 pairs in 1996, but numbers have since fallen to about 350 pairs in recent years (Graham Ekins *pers comm*.). Colour-ring resightings, DNA analyses and biometrics studies indicate that there is a considerable *sinensis* component to this and other tree-nesting colonies in England (Ekins 1997, Goostrey *et al*. 1998, Newson *et al*. 2004).

The proposed research topics of this project were to examine:

- Post-fledging dispersal
- Sub-specific identity
- Natal dispersal and fidelity of breeding birds
- Colony growth rate
- Productivity of the colony
- Breeding cycle
- Diet of young
- Feeding area of the breeding adults
- Wintering site fidelity and the relationship to the wintering population at Abberton

Undoubtedly, much of our current understanding of inland tree-nesting cormorants in the UK is based on the findings and data from this project. Whilst the formal project ended in 2001, Jez Blackburn and colleagues at the BTO will continue to colour-ring 75-100 young per year at this colony.

Colour-ringing at the mixed *P. c. sinensis* / *P. c. carbo* colony of Rutland Water, Rutland

Rutland Water is home to a mixed colony (123 pairs in 2005) of tree nesting *P. c. sinensis* & *P. c. carbo*. This colony initially grew rapidly, but appear to have stabilised at the current level. Colour ringing at the Rutland Water colony began in the early 1990's and has continued annually since. Local ring re-sighting has been undertaken, mainly by Steve Lister, but also

by reserve staff and volunteers. Initially, small numbers of pulli were ringed, but from 1995 between 20 and 60 chicks have been ringed at the colony annually. To date, 244 birds have been ringed. Birds are fitted on the left leg with 2-letter or 1-letter/1-number coded Darvic ring, and metal BTO ring on the right leg. Darvics are blue with white lettering.

The main aims of this scheme are to examine:

- Post-fledging survival and dispersal
- Wintering site fidelity
- Relationship between this colony and other inland and coastal cormorant colonies elsewhere in the UK

Recently, DNA samples have been taken from a small number of broods, in collaboration with French workers from the University of Rennes as part of an investigation into the world-wide phylogeny of *P. carbo*.

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Ringing of Cormorants in Norman coastal colonies (France)

In Normandy, the cormorant is an emblematic species since all the French breeding colonies of cormorants were in Normandy until the mid-seventies.
Several studies of this species were chiefly done on the two main maritime colonies in Basse-Normandie : the "Île de Terre" of the islands of Saint-Marcouf (east coast of Cotentin) and the Chausey archipelago (North of the Mont-Saint-Michel bay), the both sites are GONm bird reserves.

Early years
The first period of ringing with metal rings was during the sixties and seventies : between 1962 to 1968 at Chausey and between 1966 to 1974 at Saint-Marcouf, with the manager Bernard Braillon from 1966 to 1974.
We collected some results. After 1968, no more control for the birds of Chausey - these birds scattered from the West Cotentin to the Atlantic coasts (south of Britain to Spain) - except one data from the Baie de Seine.
We obtained controls until 1991 for the birds of Saint-Marcouf : these birds scattered on the littoral from the north coasts of Spain to Netherlands (some controls in Great Britain)
Alain Chartier tested an attempt of ringing in 1995, but the lack of institutional support prevented a longer experience. However, 83 pulli at Chausey and 39 at Saint-Marcouf were equipped with metal and colour rings during this year.
This ringing trial of one year (1995) showed us that the Chausey cormorants postnuptial dispersal area moved partially towards the North-East (Saint-Vaast-la-Hougue on the East coast of Cotentin, and Dives marshes, East of Caen), and even to the Netherlands, whereas during the first seventeen years they went chiefly to Brittany.

Actual research project
The new ringing program started in 2002 and aimed to find the patterns of postnuptial dispersal. The post-nuptial dispersal of the cormorant is relatively well known. However, the closure of ringing in Norman breeding colonies prevented the study of evoluting modalities of dispersal patterns since 1970.
Breeding cormorants in GONm bird reserve of Chausey
Chausey breeders do not winter in the breeding areas of the archipelago, though very few birds stayed during December and January. The question is to know where go these birds in winter.
Breeding cormorants in GONm bird reserve of Saint-Marcouf
On the opposite, a winter resting place exist at Saint-Marcouf in the reserve. But, according to our knowledge of Chausey birds, we do not know if this resting site is occupied by local breeders or is a resting place for foreign birds.

Besides the study of dispersal patterns we question the influence of rearing conditions on the future capacity of settlement in new areas. We thought, with our previous studies, that true cultural phenomenon ordered a large part of the group sociology either in winter or during the breeding period: learning and use of the sites, knowledge of other sites, capability of settlement. We hypothesise that settled abilities of breeders depend of their own rearing conditions. To study this, we separate nestlings of early and late nests (the breeding season begin from late January to mid August) and nestlings of isolated nests and colony centres.

Ringing methods
Colour ringing seemed to be the best way to answer the questions mentioned above. The system of using colour rings is as follows:
On one leg a large plastic ring specific for each colony:
White with dark « C » letter (Chausey) and dark number 2 for the 2002 year, 3 for 2003, and so on.
Dark blue with white « M » letter (Saint-Marcouf) and white number 2 for 2002, 3 for 2003, and so on
When this ring is on the right foot (for a half of the birds), the letter is above the number for one quarter of the birds or the letter is under the number for the second quarter. When this ring is on the left foot, the same protocol is done for the second half of the birds.

On the other foot we put from top to bottom a metal ring of Museum Paris with alphanumeric code plus two colour rings among four colours: dark blue, white, red and light green.
Finally, we dispose of 64 colour possibilities per year for each colony. We ringed 128 norman birds in 2002, 128 in 2003 and 128 in 2004.

Preliminary results
Yet, controls and captures are sufficiently numerous to give us informations about the dispersal area of our local breeding birds. The birds are frequently present on fresh water. This strengthen our hypothesis as the two European sub-species of cormorant are not a real fact but there is only one species with clinal variations.
The own dispersal area of each colony is very large and become partly overcast.

Results for Chausey :
Chausey 2002 = 11 different birds (except local birds)
Chausey 2003 = 4 different birds (except local birds)
Chausey 2004 = 6 different birds (except local birds)
192 ringed birds; informations obtained for 21 ones (= 10.9 %)
coastal controls = 16
continental controls : 5

Results for St-Marcouf
Saint-Marcouf 2002 = 13 different birds (except local birds)
Saint-Marcouf 2003 = 12 different birds (except local birds)
Saint-Marcouf 2004 = 9 different birds (except local birds)
192 ringed birds ; informations obtained for 35 birds (= 18,2 %)
coastal controls : 27
continental controls : 8

We hope that, in the future, our results allow us to answer to our second question: is there an influence of the rearing conditions of the young birds on the future capacity of settlement in new areas.

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Cormorants colour ringing in Jeziorsko Natural Reserve, Central Poland

The new project of cormorants' colony evaluation and cormorants colour ringing started in Jeziorsko Natural Reserve (Central Poland) in 2004.
Jeziorsko Reservoir built on Warta River is one of the biggest dam reservoir (ca. 43 km^2) in Poland. It was constructed in 1986 to impound water for flood control, hydroelectric power, irrigation and water depollution [1]. A water level is seasonally variable. The reservoir is filled up during spring and then it is gradually emptying during late summer and autumn. Natural conditions of Jeziorsko are attractive for birds as a breeding area as well as a foraging place during migration [2].

A breeding colony of cormorants at Jeziorsko Reservoir was noted for the first time in 1991 [2]. It is one of few breeding colonies in central Poland [3]. Every year it is situated in south-western part of Jeziorsko Reservoir (51°73'N 18°63'E). This area is included into Jeziorsko Natural Reserve, which was constituted in 1998 for protection of breeding and migrating birds. The colony is located approx. 200 m from the reservoir bank near the riverbed. In year 2004, 435 nests of cormorants were built on willow (Salix sp.) scrubs. The colony covered approx. 4 ha of shallowly inundated area that formed little islands within. The willows were 3 to 10 m high and the nests were located at 2,5 to 9 m, what allowed to control easily the nests of entire colony. It also permitted to ring a significant percentage of the pulli. There were not found any other water bird species breeding inside the colony. Nearby, in a circle of approx. 1 km, breeding of grey herons, white egrets, black-headed gulls and whiskered terns was reported.
During breeding season regular check-ups of the nests were performed every week. It allowed to obtain data that will serve as a basis to further detailed analyses. Breeding success in relation to the nest location in spatial structure of the colony and to the date of eggs laying will be the primary target of the study. Moreover collecting food items and ringing pulli will widen and profound the research.
The ringing of cormorant pulli was also performed. 322 cormorant pulli from 100 nests (23 %) received metal rings (Poland, Gdansk) on left tarsus. Among them 261 (81%) got colour rings on right tarsus. The colour rings have green background and the white triliteral codes started with R. The co-operation with local fishermen provides collecting all the cormorants caught in fishing nets. Frequent birdwatchers penetration of the reservoir brings the information of ringed juveniles.
There have been reported first long-distance records of colour ringed cormorants in Jeziorsko, for example one from north-western France.
The further investigation of the colony and colour ringing are planned to be performed in the following years.

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Other new ring studies

Phalacrocorax carbo sinensis - Lituania (to be started in 2005)
Phalacrocorax pygmeus - Serbia (besides Hungary, see this number)

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