Sailing Down-Wind, a Breakwaters' Perspective on the Great Cormorant

Source: Ardea, 109(3) : 265-269

Published By: Netherlands Ornithologists' Union

URL: https://doi.org/10.5253/arde.v109i2.a1

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By documenting the developments in Cormorant distribution, numbers and foraging activities, this special issue of Ardea highlights some of the latest research findings, but also reflects on the ongoing debate about how we need to see the perceived conflict with fisheries and angling interests that has kept us busy for so long. By bringing together this diverse collection of papers from all over Europe and Israel we are convinced that this will not only lead to a better understanding of the species but will also be of help in addressing the questions around this conflict that still remain. The species is fascinating in its flexibility to respond to changes in environmental conditions. It is perhaps that flexibility, that ever-existing power of Cormorants to find a way out when conditions change, that has attracted the attention of researchers for so many years and, at the same time, has made the birds so thoroughly hated by many who have vested interests in fisheries. Interestingly, during the same period the Double-crested Cormorant *Phalacrocorax auritus* has raised the same questions in the United States and Canada and has been subject to rigorous control measures (e.g. Wires 2014). Rather than demonising Cormorants for their predation on fishes, perhaps we can learn a lot from their way of fishing, from the way that they, unlike many human users in the same habitats, have never been shown to over-exploit healthy, natural systems.

Umm al Quwain, United Arab Emirates, 14 October 2019

I am sitting by a huge boulder at the breakwater on the northernmost tip of the peninsula of this lesser-known emirate in the UAE in order to watch the early morning flight of Socotra Cormorants *P. nigrogularis*. The expected daytime maximum temperature will be 36°C very soon and no significant changes are forecast for the rest of the week. It is seven years ago since I was here for the first time to study these birds, one of the fascinating cormorant species on Earth. Socotra Cormorants breed under extreme desert conditions, produce no pellets so as to conserve every bit of water and have many more unique adaptations to the tremendous heat whilst breeding in huge assemblies on bare soil. Being a social forager, carpet-like flocks of tens of thousands of birds move whilst fishing across the shallow parts of this region of the Gulf, perfectly timed so as to meet the congregations of pelagic fish here. The nearby Siniya Island is one of the strongholds of the population, with an estimated 40,000 breeding pairs (over 100,000 birds) that congregate on the ground (Muzaffar 2015).

The reason for starting the preamble to the special issue of Ardea with this species and at this very spot is twofold: first, I realise how vulnerable this cormorant species is, despite the huge numbers that are present in the Gulf region and second, I am aware how fast developments in the environment can proceed. Although absolute numbers of the entire population may still be 300,000 birds (Birdlife International 2021), the breeding sites of Socotra Cormorants have been developed into built-up urban areas at tremendous speed, turning islands and areas of shallow water into towns and cities, the most populous examples being Dubai and Abu Dhabi. Umm al Quwain is also undergoing development and since 2017 many new buildings have been established and the large-scale renovation of the Old Town and the original harbour is ongoing. Most directly affecting the Socotras are the plans to build extensive tourist resorts on the island, connecting it to the mainland. This might seriously interfere with the functioning of the currently unspoiled natural lagoon ecosystem with its tidal mudflats, extensive mangrove and sparsely vegetated sand spits that are home to thousands of migratory waders, ducks, flamingos and raptors as well as to soft corals, fishes, sea turtles and a wealth of invertebrate life. This is one of the few biodiversity hotspots still existing in this part of the world (see Whelan *et al.* 2017).

Having said this, the huge number of Great Cormorants *Phalacrocorax carbo* that we had in The Netherlands in the late 1980s and early 1990s after the peak levels of aquatic eutrophication produced foraging flocks that were similarly spectacular to observe. The massive ground-breeding that occurred during that period was well before the arrival of the Red Fox *Vulpes vulpes* that changed the scene completely. The 30 years that have passed since those turbulent times have been used to conduct research that was partly devised in order to help inform the debate about cormorant-fisheries interactions. The EU-funded research networks REDCAFE and INTERCAFE (see Carss 2021) were instrumental in providing the time needed to explore

and collate the perspectives of the diverse stakeholders involved in cormorant-fisheries interactions, accompanied by a constant informing of these debates by sound science. Data deficiency is always an issue in such ventures and so one can never say that enough research has been carried out. Although the conflict has not been solved, the common opinion is that, after 30 years of arguing and continuous pushing and pulling, the situation is perhaps becoming more stable. Certain countries (e.g. France) have adopted the policy of shooting Great Cormorants spending the winter there, initially started 'to prevent serious damage' to fisheries, while others like The Netherlands and Portugal have hardly interfered at all with their roosts or breeding sites. The question whether these derogations issued to manage birds have had an overall, a local, or even no effect at all, is difficult to answer in terms of the numbers of birds (to say nothing of possible effects on subsequent predation rates and on fish stocks or catches). However, given the parallel Cormorant population developments in countries with (e.g. Denmark) and without management (The Netherlands), any direct outcome of these countrywide management actions is at least questionable.

Sitting at a breakwater on the edge of the desert surrounded by the sea makes you think. Despite the many differences between the species, Socotra Cormorants may well have far more parallels to Great Cormorants than one may first think. Their future not only depends on safe breeding grounds, but also on the availability of the big shoals of small fish, such as anchovy *Encrasicholina* spp. and sardine *Sardinella* spp., that appear commonly in their diet (Muzaffar *et al.* 2017). Climate change, increased use of habitat – at sea as on land – will take its toll, the species being confined to the Gulf area except for a small population in Oman. This also reminds me of the fact that our personal background will 'frame' how we each interpret our own observations. In the case of Socotra Cormorants, I intuitively feel the necessity to protect them and to think in terms of a transboundary species management plan implemented across states. Ironically, such management plan has never been achieved on a European level. Apart from the obvious differences between the situation of a rare, endangered population and that of an increasingly abundant one, it is perhaps important then to think about how framing the issues affects perspective. The way we frame our observations will undoubtedly determine the attitude that we take. Scientific research may also be a means of framing and surely it will not be as independent and value-free as sometimes considered (see Carss 2021).

Our work on the Great Cormorant has continuously progressed. From pan-European counting programmes, detailed dietary, ringing and demographic studies, to genetics and impact assessment, this special issue mirrors the earlier Ardea one, which was at that time a reflection on a period of considerable turbulence for Cormorants (and their interactions with human interests) in western Europe. Not for nothing was it entitled 'Riding on the Crest of the Wave' (van Eerden *et al.* 1995).

It has taken us more than five years to compile this current issue, consisting of 30 papers focused on the Great Cormorant. Thanks go to all authors for their contribution, to Dave Carss and Marjolein Munsterman for their continuous support in the editing team, and to all of you who stopped asking that familiar single question: "When will it be published?"

The contents of this special issue span a range of topics, arranged in four sections as follows:

(1) Population developments, demography and migration

Having reported on the tremendous expansion of the species in western Europe since the 1980s (van Eerden & Gregersen 1995), in this section several papers show the recent developments in terms of numbers and distribution.

Based on the second pan-European Cormorant count in winter, Mennobart van Eerden *et al.* describe the results of the European winter count in January 2013 and compare this with the first one in 2003 and with the breeding census of 2012. This extensive atlas work for a species on a continental scale provides new views on the spatial network that exists outside the breeding season. By working on the massive database of metal-ringed Cormorants in the Russian Federation and the former USSR, Christina Chaika for the first time explores the migration patterns of the species on a continental scale. Svein-Håkon Lorentsen *et al.* work out the distribution of Great Cormorants in Norway, long a stronghold for the *carbo* subspecies that breeds in rocky, coastal habitats, recently becoming colonised by *sinensis* in the south. Van Eerden *et al.* describe the thriving situation for a number of colonies in the eastern Baltic where Cormorant numbers were still on the increase. In two papers by Christof Herrmann *et al.* and Thomas Bregnballe *et al.*, the apparent westerly change in migratory movements of wintering Cormorants originating from the Baltic region are considered. Loïc Marion & Pierrick Marion report on migration patterns of Great Cormorants from the largest colony in France in relation to density dependence. Savas

Kazantzidis *et al.* report on the breeding colonies of the *sinensis* subspecies in Greece, a country where numbers are also increasing. Jan de Rijk showes that the exploitation of Cormorants in specially designed rookeries in The Netherlands for centuries was a likely reason for the survival of the species in this part of Europe. Theodore Squires *et al.* present data on the expanding distribution of Great Cormorants in Hokkaido, Japan, where it meets with cormorant (sub)species that have populated the island for a much longer time.

(2) Habitat choice, food and feeding habits

Based on the habit of Cormorants to produce each day a pellet containing identifiable fish remains (Zijlstra & van Eerden 1995), studies have used pellets to describe food and feeding habits. Marijan Govedic *et al.* describe extensive food studies for Cormorants on subalpine rivers in Slovenia, a biogeographic region where many endemic fish species occur. A small river habitat of a lowland river, the Geul, in The Netherlands is studied by Stef van Rijn and both studies ask an important question about the extent to which Salmonid fishes occur in the diet of Cormorants. Jean-Yves Paquet *et al.* describe results from the long-term monitoring of Cormorant roosts along the Belgian Meuse river and relate changes in numbers and diet to changes in fish composition. Ian Russell *et al.* explore possible differences in diet composition of *sinensis* and *carbo* subspecies of Great Cormorants exploiting a fish farm in UK. In The Netherlands, van Rijn & van Eerden study the strong temporal shift in use of Lake IJsselmeer by Cormorants, where recently arrived wintering birds compete over time with local breeders that forage on the same fish stocks. Loïc Marion & Jérôme Le Gentil describe the degree of adaptation to the environment by comparing sympatric *carbo* and *sinensis* in a colony in western France.

Mauro Cosolo *et al.* report the food and feeding situation in a shallow brackish coastal system in the Italian part of the northern Adriatic, an important wintering area for the Great Cormorant. Fijn *et al.* report on habitat use by individual movement records from breeding Cormorants fitted with transmitters in the Voordelta, a Dutch shallow coastal habitat. In the same area, van Rijn & van Eerden describe the food composition of breeding Cormorants in a decade-long study, trying to detect possible changes of food composition in relation to available fish stocks and thus the degree of selection of fish by the birds. Robert Gwiazda & Adam Flis report on feeding conditions for Cormorants in two Polish reservoirs, with special emphasis on underwater light conditions. Two further papers focus on the methodological aspects of dietary studies. Bettina Thalinger *et al.* show the use of e-DNA as an alternative method of recording fish presence from pellets. For the occurrence of the rarer fish species in particular, this seems a useful possibility to extend our knowledge on Cormorant diet. In their study of the biggest winter roost in The Netherlands, van Eerden & van Rijn point to the importance of non-selective sampling of pellets, as colour, structure and size reflect diet composition. Moreover, location of sampling within the roost affects the contents and thereby results of pellet analysis, showing that apparently Cormorants are not randomly distributed at the roost.

(3) Breeding biology and reproductive ecology

Cormorant colonies with large aggregations of breeders allow studies on the possible effect of bird density on reproductive output. Colonies in turn attract predators and scavengers as they provide food for many other animals. Bregnballe *et al.* report on the effect that the increased population of White-tailed Eagles *Haliaeetus albicilla* recently had on the numbers, distribution and breeding success of Cormorants in colonies in the Baltic region. For northern Italy, Alessandra Gagliardi *et al.* describe the interaction between Cormorants and Grey Herons *Ardea cinerea* in mixed colonies. The question is whether species compete for nesting sites. Bregnballe *et al.* report on the body condition of Cormorant nestlings in three neighbouring Danish colonies, in relation to density of foraging adults in the waters surrounding each colony. In the absence of predators Cormorants breed on the ground. By analysing colony structure in three neighbouring colonies near Lake IJsselmeer in The Netherlands, van Eerden & van Eerden show that nests of ground-breeding Cormorants occurred in greater density at times of increased pressure from predators.

(4) Interaction with man, conflict management and solutions

The Great Cormorant has long been blamed for its habit of fishing in the same areas as humans. The questions this raises about their possible impact are not easy to answer with a simple 'yes' or 'no'; this is partly because emotions can play an overriding role in the debate, combined with the fact that data on fish populations and Cormorant diet are often scarce. For decades there has been a need for studies to (1) quantify the possible impact and (2) find a solution to the problem. In this section Roman Lyach and Martin Čech compare Cormorant diet with the catches of anglers on Czech rivers, while Russell *et al.* describe the use of fish

refuges as a means of alleviating the damage caused by extensive predation at fish farms. Zeev Arad reports on the complex situation in Israel where the extensive conflict with Cormorants on very intensive, commercial fish farms is countered by protection measures and wetland restoration to provide the birds with alternative foraging options. This section is concluded by David Carss, who, based on the work of the EU-funded REDCAFE and INTERCAFE research networks, explores possible means of resolving the conflict between Cormorants and human interests. Continually trying to find a direct way out through discussion of the most effective technical interventions by means of hunting, culling, or other means of Cormorant population regulation, and by debating the lack of unequivocal scientific evidence that Cormorant predation is reducing fish stocks or catches, both contribute to the apparent intractability of this conflict. Rather than continuing debates in these directions, this paper explores the important issue of a 'framing and reframing' approach that acknowledges the crucial social and cultural aspects of these conflicts. This approach, in combination with further research and practical experimentation, offers an adaptive-management approach as possibly the best option for addressing Cormorant interactions with fisheries interests.

Lelystad, The Netherlands, 11 June 2021, sailing down-wind

Our dikes in The Netherlands protect us from the water and living in a polder at –4 m below sea level never made me feel anxious. Biking to the breakwater-armoured harbour of Lelystad, I will sail to Marker Wadden today, the newly created wetland area in Lake Markermeer. Cormorants have become scarce in what just a few decades ago was one of the hotspots of the species in Europe. Oostvaardersplassen, in 1993 home to 8800 breeding couples, at that time the largest colony of the species in Europe (van Eerden & Gregersen 1995), has 60 nests only in 2021. A well-documented story that still needs to be written up in full. However, the fact that in The Netherlands nobody has ever intervened in colonies, nor used culling as a management measure makes you think about the environmental changes in living conditions that have caused this downturn. The day at the island and the north-eastern parts of Lake Markermeer, formerly being the scene for endless long flights of commuting birds, resulted in only a few Great Cormorants observed, 32 to be exact. The same constructors that have altered the coastline in the UAE so extensively have just completed their works at the Marker Wadden to create an archipelago of 700 ha of wetlands where before 2016 there was only 4 m deep water. Future will tell whether our expectations come true that these man-made wetlands become home to colonies of fish-eating birds, including the Great Cormorant, Spoonbill *Platalea leucorodia*, egrets and herons and perhaps the Dalmatian Pelican *Pelecanus crispus*, extinct in The Netherlands since Roman times. I'm literally sailing down-wind now, as the skipper of MV Abel Tasman (Kiel, 1920), hoisted all four fore-sails to increase cruise speed, back to Lelystad.

It is hoped that the sub-title of this special issue 'Sailing down-wind' will be a pointer for the future of the debate about Cormorant issues but also continue to increase pressure to safeguard the environment of that particular set of shallow-water zones that range from coastal, estuarine, river and lake habitats, all of which, at the continental level, are transitional between deep water and land, alongside all the biodiversity at each trophic level within that complex system. There is no doubt that Great Cormorants belong to such systems, as an efficient, highly mobile and adaptive top-predator. Sailing down-wind is, for a sailor, perhaps not the most exciting period at sea, although at least there is the realistic expectation of reaching one's destination. Prior to 'final', the term 'down-wind' also positions the aircraft pilot's glide just before landing at an airstrip, having the engine already throttled. Having flown over Lake IJsselmeer to monitor waterbirds each month for 40 consecutive years in a seemingly endless series of aerial inspections, I have been watching the population of Cormorants settle, expand and be reset again, always with unexpected moves and adaptations both on water and on land. Perhaps just a wishful thought, but I feel this apparent natural cycle in abundance and habitat use may also guide us as to re-orientate our opinions with respect to the conflict between Cormorants and fisheries as well as its resolution.

We acknowledge the financial contributions made available for producing this special volume: EU-CorMan project (Thomas Bregnballe), Rijkswaterstaat (Katja Portegies) and some of the time that could be spent by MRE and DNC on this seemingly endless, but definitely fruitful joint venture. Since 1994 the Cormorant Research group was instrumental to cormorant workers throughout Europe and beyond. Thanks to Wetland International and IUCN-Species Specialist Commission for additional support hosting us as a specialist group.

Thanks also to the external reviewers Rob Bijlsma, Bart Kempenaers, Theunis Piersma, Allert Bijleveld, Roeland Bom, Adriaan Dokter, Rienk Fokkema, Martijn

Hammers, Sjouke Kingma, Raymond Klaassen, Peter Korsten, Thomas Lameris, Tamar Lok, Wouter Vansteelant and Popko Wiersma. Megan Dickens improved the English writing and Arie Spaans made improvements to the Dutch summaries.

Dick Visser carefully prepared and adjusted figures and lay-out, Jos Zwarts took the challenge to prepare all Cormorant drawings. Popko Wiersma managed the back-and-forth stream of manuscripts between the Ardea, guest, text and print editors.

On behalf of the guest editorial team of this special issue, David Carss and Marjolein Munsterman,

Mennobart van Eerden

Birdlife International 2021. Socotra Cormorant (*Phalacrocorax nigrogularis*) – BirdLife species factsheet.

Carss D.N. 2021.There must be some kind of way out of here: towards 'reframing' European cormorant-fisheries conflicts. Ardea 109: 667–681.

Muzaffar S.B. 2015. Ecology and conservation of the Socotra Cormorant (*Phalacrocorax nigrogularis*) in the eastern Arabian Gulf. In: Mahala G. (ed.) Seabirds and Songbirds: Ecology, Conservation and Migratory Behavior. Nova Science Publishers, Inc., New York, pp. 135–146.

Muzaffar S.B., Gubiani, R., Benjamin S., AlShihi, R., Al-Romithi A. & Al Kaabi F.H. 2017. Food consumption patterns of the Vulnerable Socotra cormorant *Phalacrocorax nigrogularis* indicate minimal overlap with fisheries in the eastern Arabian Gulf. Oryx 51: 115–123.

van Eerden M.R. & Gregersen J. 1995. Long-term changes in the Northwest European population of Cormorants *Phalacrocorax carbo sinensis*. Ardea 83: 61–79.

van Eerden M.R., Koffijberg K. & Platteeuw M. 1995. Riding on the crest of the wave: Possibilities and limitations for a thriving population of migratory Cormorants *Phalacrocorax carbo* in man-dominated wetlands. Ardea 83: 1–9.

van Eerden M.R., van Rijn S., Volponi S., Paquet J.-Y. & Carss D.N. 2012. Cormorants and the European Environment: Exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I, NERC Centre for Ecology & Hydrology, UK. https://tinyurl.com/ygjfs8bc

Whelan R., Jabado R.W., Clarke C. & Muzaffar S.B. 2017. Observations of rays and guitarfish (Batoidea) in shallow waters around Siniya Island, Umm Al-Qaiwain, United Arab Emirates. Tribulus 25: 76–80.

Wires L.R. 2014. The Double-crested Cormorant: Plight of a Feathered Pariah, Yale University Press, New Haven and London.

Zijlstra M. & van Eerden M.R. 1995. Pellet production and the use of otoliths in determining the diet of Cormorants *Phalacrocorax carbo sinensis*: trials with captive birds. Ardea 83: 123–131.