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# Israel-Ukraine Cooperation for Experimental Management of a Shared Overabundant Population of Great Cormorants (*Phalacrocorax carbo*)

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**Abstract:** Since the mid-1980s, there has been a steady rise in the numbers of great cormorants in all Eurasia, and in the number over-wintering annually in Israel. Winter counts in recent years show about 15,000 - 20,000 great cormorants in Israel; they arrive in October and stay until March. Over the years, colonies of over-wintering great cormorants, which can have over 5,000 individuals each, come into conflict at commercial fish farms in Israel, which are in the form of local concentrations of open earthen ponds, in which are grown very high concentrations of food fish, mainly carp, tilapia, grass carp, and mullet. Over the years, many attempts have been made to reduce the negative impact of over-wintering great cormorants on the commercial fish farms in Israel, utilizing lethal and non-lethal methods. Over 50 banding returns from the last 2 decades showed that the great cormorants over-wintering in Israel originated in the area around the northern Black Sea and Sea of Azov, around the Crimean Peninsula in southern Ukraine (about 1400 km or 850 miles due north). This overabundant species causes considerable damage around its nesting sites in Ukraine by interfering with endangered waterbirds, and by conflicting with fishermen. Israel has recently been exploring ways to utilize international cooperation for management of the nesting population in Ukraine, in order to reduce the size of the wintering population in Israel and also to prevent damage to endangered waterbirds in Ukraine. The major instruments are the European Union's project INTERCAFE (Interdisciplinary Initiative to Reduce Pan-European Cormorant-Fisheries Conflicts: www.intercafeproject.net), and the African-Eurasian Waterbird Agreement (AEWA) under UNEP's Convention on Migratory Species (CMS): www.unep-aewa.org, as well as other International Environmental Agreements. An experimental program is proposed for reducing the nesting success of the Ukrainian population. A smaller great cormorant population should impact less upon nesting waterbirds in Ukraine and also decrease the intensity of the conflict with both Ukrainian and Israeli fishermen, thereby lessening the extent of lethal control used against great cormorants in both countries. The proposed experimental program includes egg-oiling of ground-nesting birds and hazing tree-nesting birds with green lasers.

**Key Words:** bird banding, bird control, Black Sea, Crimean Peninsula, depredation, egg oiling, great cormorant, Israel, laser, non-lethal, *Phalacrocorax carbo*, Ukraine

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## INTRODUCTION

Populations of great cormorants (*Phalacrocorax carbo*) have increased over the past 2 decades all over Eurasia (Papazoglou et al. 2004, Delany and Scott 2006). In many countries, these overabundant populations impact negatively with human interests – such as angling and commercial fish farming (Heinimaa 2007), as well as causing damage to the environment (e.g., Rudenko and Yaremchenko 2005). This paper describes the premise for a proposed experimental project utilizing international cooperation between Israel and Ukraine and various IAEs (International Environmental Agreements) for reducing the nesting success of great cormorants in southern Ukraine.

## GREAT CORMORANTS IN ISRAEL

Since the mid-1980s, there has been a steady rise in the numbers of great cormorants arriving to over-winter each year in Israel. Winter counts in recent years have shown about 17,000 to 29,000 great cormorants over-wintering in Israel annually (Figure 1).

Arriving in October, they stay in Israel until March, roosting in large colonies along the Mediterranean and Red Sea coasts and at inland streams and wetlands. There are no nesting colonies of great cormorants in Israel, and it is the policy of the INPA not to allow any great cormorants to nest, so as not to create a domestic population of this species.

Over the years, the roosting colonies of over-wintering birds in Israel, each of which can consist of as many as 5,000 individuals, come into conflict with fish farmers. The fish farms in Israel are in the form of local concentrations of open earthen ponds, where very high concentrations of fish, mainly carp, tilapia, grass carp, and mullet, are raised for food. More detailed information on the fish farms in Israel, and the nature of the cormorant-fisheries conflict in this small country, have been detailed in the re-

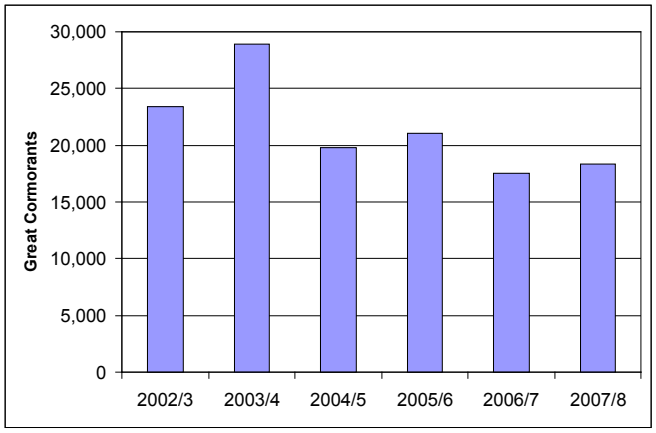


**Figure 1. Counts of great cormorants over-wintering in Israel, as counted in January each year.** Data from Hatzofe (2007) and Davidson (2008).

port of a meeting which took place in Israel's Hula Valley in January 2006 (Carss 2006).

Over the years, many attempts have been made to reduce the negative impact of these over-wintering great cormorants on the commercial fish farms in Israel. Among these, are lethal and non-lethal methods, such as:

**Non-Lethal Methods:** pyrotechnics, gas cannon, scarecrows, mirrors, lasers, fish refuges, regional scaring (by day at fish farms, but especially at night roosts up to 20 km from fish farms), and overhead netting.

**Lethal Methods:** Permits have been issued each year by the Israel Nature and Parks Authority (INPA) allowing each fish farm to shoot up to 6 cormorants per fish farm per day from October to March.

None of these methods, lethal or non-lethal, have proven to be entirely successful or without concomitant problems, so the INPA is continually looking for new methods or techniques that can reduce the conflict (Davidson 2008).

Among the findings discussed in the 2006 Hula Valley meeting was the observation, presented by O. Hatzofe of the INPA, that all 50 banding returns from the last 2 decades have shown that the great cormorants that overwinter in Israel originate in southern Ukraine around the Crimean Peninsula near the northern Black Sea and Sea of Azov, especially in the Sivash region (Point 4 in Figure 2).

## MISSION TO UKRAINE – MAY 2007

Subsequent to recommendations coming out of the 2006 Hula Valley meeting, the wildlife ecologists of INPA decided to try to build a cooperative management program to reduce the common population of great cormorant that we share with Ukraine. The premise is to see if we can proactively reduce cormorant numbers, instead of just dealing each year with the large cormorant population that arrives to over-winter. Contacts with cormorant experts in Europe who have worked in Ukraine led me to the primary ornithological institute in the region, the Azov-Black Sea Ornithological Station (Azblackornis) in Melitopol, Ukraine, and to Dr. Valeri Siohkin, who is in charge of cormorant issues, and to Dr. Iousef Chernichko, the Director of Azblackornis. This institute is associated with Birdlife Ukraine and Birdlife International.

I traveled to Ukraine during the spring 2007 nesting season and covered over 1,200 km throughout southern Ukraine, in around the Crimean Peninsula, to see and learn about cormorant issues in this area. There I met Dr. Vasily Kostiushyn, the Head of the Department of Monitoring and Conservation of Animals of the Ukrainian National Academy of Science, who is the scientific coordinator for Ukraine for AEWA (see below), and who is now my main contact in Ukraine for continued planning of the Israel-Ukraine joint management experimental project. Dr. Antonina Rudenko, an expert on waterbirds and the Scientific Director of the Black Sea Biosphere Reserve, took me to the Reserve's Horse Islands (Point 2 in Figure 2), where

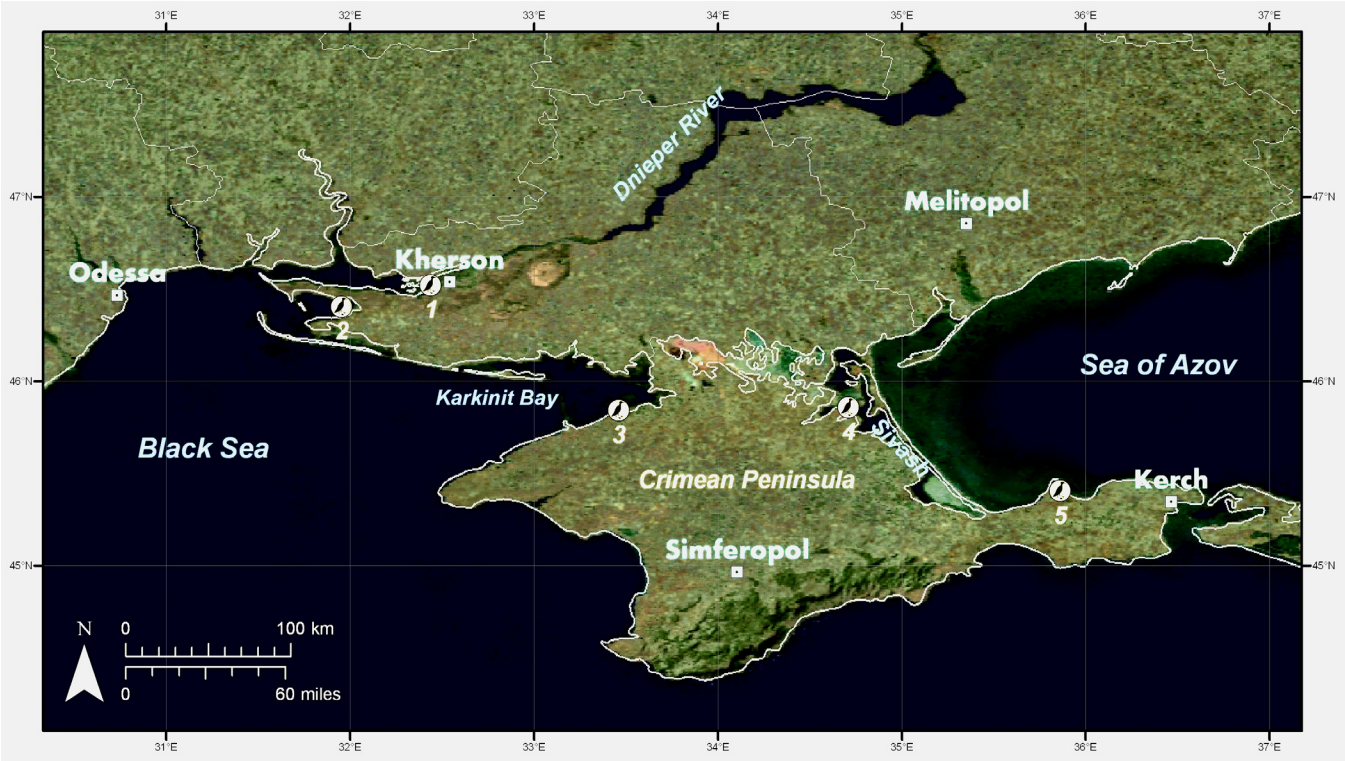


**Figure 2. Map showing the five sites visited by the author in a mission in May 2007 to southern Ukraine and the Crimean Peninsula, approx 850 miles or 1,400 km from northern Israel, where the nesting colonies of the great cormorants that over-winter in Israel are located. Numbered sites are: 1. The Dnieper wetlands; 2. The Black Sea State Biosphere Reserve and the Horse Islands; 3. The Swan Islands of the Crimean Nature Reserve at Portovoye; 4. The Sivash region; 5. The Shelkeeno Nesting Colony near Cape Kazantip.** (map by M. Frumin).

approx. 5,000 great cormorants were ground-nesting in approx. 2,000 pairs on islands located in a large shallow lagoon (A. Rudenko, pers. commun.).

At the Crimean Nature Reserve, the largest nature reserve in the Crimean Peninsula (UNEP *undated*), which is on the northwestern arm of the Crimean Peninsula and includes the Swan Islands off the coast in the Karkinit Bay (Point 3 in Figure 2), I met Dr. Natasha Tarina, the head biologist of this branch of the nature reserve. She explained that great cormorants began nesting on the Swan Islands in 1976 when local fish farms were established in nearby shallow ponds, despite warnings by the ornithologists that fish-eating birds would cause them problems. The fish ponds were stocked with juvenile fish for growing, and great cormorants would attack the ponds. The scientific staff began cormorant management in 1983 after cormorant numbers increased and apparently impinged on nesting of other waterbirds and damaged natural vegetation on the islands (N. Tarina, pers. commun.)

Later, I traveled to a nesting colony located on the north-eastern arm of the Crimean Peninsula, on the shore of the Sea of Azov, approximately 50 km west of the city of Kerch (the border with the Russian Republic), near the town of Shelkeeno on Cape Kazantip (Point 5 in Figure 2). This is the largest nesting colony of great cormorants in Ukraine (V. Siokhin, pers. commun.) with over 15,000 nests in 2006 (J. Gregersen, pers. commun.). Here, the great cormorants nest in a large man-made forest of fir trees along the coast, where the bird droppings cause heavy damage to the trees.

## GREAT CORMORANTS IN UKRAINE

Great cormorant populations in the Azov-Black Sea region have increased over the last few decades (Schogolev et al. 2005) to the point that there are apparently now about 100,000 pairs of great cormorants around the Azov-Black Sea region, with about 85% of them nesting in and around the Crimean Peninsula in southern Ukraine (I. Chernichko, pers. commun.). Not all nesting colonies are known, and new ones are constantly being discovered, especially as great cormorants are moving more and more into inland rivers and wetlands over recent years (V. Siokhin, pers. commun.).

The great cormorant is a protected species in Ukraine, so a permit is required for any active management. The Ukrainian ornithologists and nature reserve biologists view the great cormorants as an overabundant species causing conflicts (in descending order of importance) as follows:

1. The overabundant great cormorant population has profound negative ecological and economical effects at the breeding areas in Ukraine. Large and expanding colonies of ground-nesting cormorants on islands and coastal areas harm other ground-nesting waterbirds (such as gulls, herons, and terns) and endangered species such as black-headed gull (*Larus ichthyaetus*) (Rudenko and Yaremchenko 2005).
2. Large populations of great cormorants cause financial losses to fishermen in the Black and Azov Seas and in inland fish farms (I. Chernichko, pers. commun.).
3. Large populations of tree-nesting cormorants damage trees in man-made forests near coastal areas (V. Siohkin, pers. commun.).

The general theory provided by the Ukrainians to explain why the great cormorant population increased in the Azov-Black Sea region is as follows: In the 1960s and 1970s, the Soviets began large projects to build new watercourses to bring freshwater from the Dnieper River southward into the Crimean Peninsula for agriculture and drinking water. With the availability of large amounts of freshwater, new fish farms were established at that time (mainly in the northern Crimea), thereby increasing the attractiveness of the region to cormorants. Although many of these fish farms eventually closed after the collapse of the Soviet Union in 1991, and the subsequent collapse the Ukrainian economy, the theory is that the creation of new wetlands and the availability of high concentrations of fish in these fish farms created the "ecological trigger" that enabled the species to begin exponential growth which resulted in their becoming an overabundant specie,s even after the fish farms closed (V. Siohkin, N. Tarina, and I. Cherichko, pers. commun.).

The biologists at the Crimean Nature Reserve have organized and supervise a very limited cormorant management program as follows: the reserves' rangers and biologists go to the islands simply to disturb the cormorants for a short while, thus allowing the large number of gulls there to sweep in and predate upon cormorant eggs and chicks. These measures have limited effect in damaging the cormorant nesting success, as the cormorants will usually lay a new clutch within 2 weeks. No joint management or discussion of cormorant issues occurs in combination with local people or fishermen. Local fishermen sometimes often "take the law into their own hands" and go illegally to the islands to attack the nesting colonies, usually with sticks to break eggs and kill chicks. Like the controlled management mentioned above, these illegal activities have only a limited and an unquantified effect on nesting success. But, as opposed to the situation under the controlled work by the staff of the nature reserve, the nesting of endangered birds is sometimes harmed during these illegal operations (N. Tarina, pers. commun.).

## PROPOSED EXPERIMENT

The proposed experiment for the reducing nesting success of nesting great cormorants in Ukraine is expected to begin in spring 2009, and will involve three major parts:

1. Egg-oiling at major ground-nesting sites in Ukraine.
2. Dispersal from tree-nesting sites using green lasers.
3. Monitoring of population changes in Israel and Ukraine.

Egg-oiling has been successful for managing cormorant populations in a variety of sites, such as the St. Lawrence River (Bédard et al. 1995, 1997), the great Lakes of North America (Johnson et al. 2001), Denmark (Jepsen and Olesen 2008), southern Ontario (Ontario Ministry of Natural Resources 2006), and upstate New York and Vermont (Duerr 2007). For example, egg-oiling caused an approx. 40-fold reduction in chick fledgling rates, from

1.2 chicks per nest to 0.036 chicks per nest (Johnson et al. 2001). After egg-oiling, the adults continue to brood these eggs for a number of weeks until it is "too late" in the season to begin a new clutch, as opposed to the situations where eggs are simply destroyed and a replacement clutch of eggs is often laid immediately (see above).

According to FRAP estimates, successful long-term reduction of cormorant population size, demands oiling at least 74% of the eggs (Klenke et al. 2006). The proposed experimental project in the Ukraine will target 5 to 9 of the largest ground nesting colonies and the Kazantip tree-nesting colony (above). The aim is to oil as many eggs as possible at these sites according to a set protocol that will likely require 2 to 3 oiling sessions at each site per season. During spring 2008, the reserve biologists will conduct pilot projects to establish and test egg-oiling and laser hazing protocols, and in 2009 large-scale egg-oiling and laser-hazing will be conducted annually for 4-5 years (depending on funding).

Models of cormorant populations under active egg-oiling management have shown that there is a lag time of approx. 2 years between the beginning of the egg-oiling and actual reduction in population size (e.g., Frederiksen et al. 2001, Duerr 2007).

Dispersal of tree-nesting cormorants will be done with green lasers directed at the nests by a trained operator from atop a nearby hill. Preliminary tests of powerful green lasers (~50 mW) in Israel have shown them to be more effective than the red laser (~5 mW) of the Desman FLR 005 laser rifle; the latter achieves satisfactory results, but it is far more expensive than the handheld green lasers (Davidson and Hatzofe 2006, Ghendler 2007).

## THE EU, IEAs, AND GREAT CORMORANTS

Although Israel is not part of the European Union (EU), its status as an EU Neighboring Country and its advanced scientific and democratic institutions have ensured close cooperation between Israel and the EU in a large variety of programs. Because of their knowledge and experience in cormorant issues, Israelis have been active participants in European projects on cormorant management, such as REDCAFE (Reducing the Conflict between cormorants and Fisheries on a Pan-European Scale; see: www.intercafeproject.net/pdf/redcafefinalreport.pdf) and the subsequent project INTERCAFE (An Interdisciplinary Initiative to Reduce Pan-European cormorant-Fisheries Conflicts; see: www.intercafeproject.net), which is designated as Action 635 by the COST program (Cooperation in Science and Technology), which is part of the ESF (European Scientific Foundation). As mentioned above, INTERCAFE held its first case study meeting in the Hula Valley in northern Israel in January 2006.

A number of International Environmental Agreements (IAEs) have stakes in the proposed experimental project between Israel and Ukraine. Negotiations are ongoing to involve these IAEs in the experimental project at the time of writing this paper (March 2008), so their inclusion here should not be misconstrued as endorsement or support of the experimental project.

Israel and all the member states of the EU are party to the African-Eurasian Waterbird Agreement (AEWA) under the Convention on Migratory Species (CMS) of the United Nations Environmental Program (UNEP), see: www.unep-aewa.org. Like Israel, Ukraine is not an EU member state, but it also is classified as an EU Neighboring Country. Ukraine is also a signatory Party to AEWA.

Another stakeholder in this experimental project is the Black Sea Biodiversity and Landscape Conservation Protocol to the Convention on the Protection of the Black Sea against Pollution (also known as the Bucharest Convention), which was signed in Sofia, Bulgaria in 2002 and has six parties: Bulgaria, Georgia, Romania, Russian Federation, Turkey, and Ukraine (see: www.blacksea-commission.org/main_header.htm). This protocol includes clauses about the protection of biodiversity in the region and the protection of endangered species.

A workshop in Bonn, Germany in November 2007, organized by the EIFAC (European Inland Fisheries Advisory Commission) of the UN's FAO (United Nations Food and Agricultural Organization), created a new initiative for pan-European management of great cormorants (Heinimaa 2007). At the time of writing this paper (March 2008), this initiative is awaiting EIFAC endorsement.

UNEP's Ramsar Convention for the protection of wetlands also includes clauses for protecting endangered waterbirds. The Secretariat of the Convention has been contacted to endorse this experimental project.

In addition to these IAEs, two NGOs (Birdlife International, and the Wetlands International cormorant Research Group) have been contacted to request their endorsement of this experimental project.

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