

Information of Cormorants at Swedish lighthouses

Great cormorant birds are frequent visitors to Swedish lighthouses. They have found our lighthouses to be a perfect resting and outlook spot while searching for food.

We have now an increasing problem with bird droppings which are left at the lighthouses.

The problem is severe. When entering one of those lighthouses you have to have protective disposable clothes. The bird dropping are soft and is unbelievably smelly, everything that you come near by after your mission will be affected by the smell!

The spilling is a threat to the maritime safety red lighthouses become very quickly white. We are struggling with solar panels and alternative energy supply to create a good light range! But all this work is of no use when the Cormorants have been visiting the lighthouse.

During the last years the bird has spread very rapidly and is now habituated longer north than usual.

To analyse the best measure to take, we invited a university student to do a dissertation on our problem. His report with analysis is attached.

To scare the birds away from the lighthouse would have been the easiest way to deal with this problem, but it did not work as we wished. We are now taking measures in mechanical terms to prevent the Great Cormorant from landing on the lighthouse, it involves more work but the result is better.

We are now putting up sheep fence and also using stainless welding thread collected in small bunches. The long thin thread is moving in the wind and has a good preventive effect.

Christian Lagerwall
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Cormorants at Swedish lighthouses

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Analysis of the current situation and an evaluation of scarecrows

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Contents

1	Current situation	2
2	Cormorant birds	3
3	Evaluation of scarecrows	5
3.1	Mocking birds	5
3.2	Gas cannons	5
3.3	Sound scarers	6
3.4	Lasers	7
4	Electromagnetism	9
4.1	Birds and electromagnetism	9
4.2	Lighthouses with mobile phone base stations	9
5	Results and disscusion	11
5.1	Scarecrows	11
5.2	Electromagnetism	11
6	Future areas of interest	12

1 Current situation

The Swedish Maritime Administration is responsible for the maintenance and operation of lighthouses in Sweden. Currently there are close to one thousand lighthouses in operation scattered along the Swedish coastline. Even though all of these lighthouses are automated they do require regular overhaul by personnel from the Swedish Maritime Administration.

Great cormorant birds are frequent visitors to Swedish lighthouses. The birds use lighthouses as resting and lookout spots while searching for food. Different reasons that causes lighthouses to be popular cormorant gathering places are further described in the next section.



Figure 1: Cormorant droppings on lighthouse

An obvious side effect of the visiting cormorants are the abundant amounts of bird droppings on the lighthouses. Cormorant droppings leave an unpleasant odour and are considered to be an inconvenience by Swedish Maritime Administration personnel. Droppings also cause increased cleaning and repainting needs of lighthouses.

2 Cormorant birds

A cormorant is a seabird, more precisely a pelican bird feeding solely on fish. The latin name of the bird is *phalacrocorax carbo*, literally meaning black bald raven.[Breife, 1993]. The body length of an adult cormorant is between 80 to 100 cm and the wingspan can be up to 160 cm, so cormorants are relatively large seabirds.

The cormorant bird have populated the area around the Baltic sea for over nine thousand years[Engström, 2001]. The bird was extinct from Sweden by man sometime in the end of the nineteenth century[Fiskeriverket, 1998]. Contributing factors included excessive hunting and intentional attempts to exterminate [Jonsson, 1998].

The reinstatement started cautiously in 1940 and accelerated in 1980. The number of breeding cormorant couples in Sweden had in year 2006 reached 49 000, the highest number in Europe. It is actually a subspecies of the great cormorant, the *phalacrocorax carbo sinensis*, that is responsible for this impressive comeback. The cormorant is currently protected by the Eu's bird directive. [Johansson, 2000]



Figure 2: A Great Cormorant drying its plumage

Cormorants feed by catching fish in lakes and oceans, sometimes diving to depths exceeding fifty meters. The ability to swim freely is greatly improved by the fact that the cormorant's plumage is adhesive to water, this is in contrast to regular seabirds which have a nonadhesive plumage[Jonsson, 1998]. Because the plumage is not waterproof cormorants cannot allow themselves to stay wet for longer periods of time, this would make them subject to hypothermia. To counter this problem cormorants frequently position themselves in a very characteristic pose to dry their plumage, this characteristic pose can be observed in figure 2.

Also characteristic for cormorants are the unpleasant odour caused by their plentiful amount of droppings. Figure 3 displays another characteristic phenomena of the cormorant's faeces, it is very loose in consistency and therefore

dyes the underlying ground white. These two factors are the main reasons why cormorants visiting lighthouses are a case of concern for the Swedish Maritime Administration.



Figure 3: Great Cormorants on Havreön, Finland

An adult cormorant has, apart from man, only one natural enemy. A recent study [Helander, 2000] has revealed that cormorants constitute a significant part of the sea eagle's regular diet.

3 Evaluation of scarecrows

3.1 Mocking birds

The Swedish Maritime Administration have tested six plastic eagle owls at six different lighthouses in Sweden. An unknown number of these plastic owl were modified to rotate when the wind changed direction. Such a rotating plastic owl is seen in figure 4.



Figure 4: A plasitc eagle owl

An evaluation of a plausible effect on the number of visiting cormorants were carried out after the installation of the plastic owls. Unfortunately no data containing the number of visiting birds on the lighthouses before the installation were recorded. Also the point of time for the installation was not noted.

The evaluation at these six lighthouses reveals that a plastic owl is ineffective as a cormorant scarer. Cormorants remained a very much common sight at all of these lighthouses some time after the installation of the plastic owls. A Swedish cormorant expert, Doctor Henry Engström at Uppsala University, remarks that plastic eagle owls would be very unlikely succeeding in scaring cormorants since not even real eagle owls constitute a threat to an adult cormorant. Doctor Engström further believes it will be difficult to find any way to scare cormorants of lighthouses without seeing them habituate to the scarecrow, given enough time to do so.

3.2 Gas cannons

A gas cannon ignites liquified petroleum gas to create a sound effect that scares off birds. It can also be programmed to ignite gas at random intervals to make it more efficient. Figure 5 illustrates a gas cannon from Nordanvik AB.

An evaluation done by Viltskadecenter (a service center that aims at investigating and preventing damages caused by wildlife) revealed that gas cannons are an effective way to disperse birds. Viltskadecenter tested gas cannons on



Figure 5: A gas cannon from Nordanvik

a field, frequently used by crane birds, outside the town of Örebro in central Sweden. The test outcome showed an 84% reduction of number of visiting crane birds. Unfortunately a potential habituation effect was not thoroughly examined since the experiment only lasted for 30 days.

The Swedish Maritime Administration installed one gas cannon at the lighthouse Svinbådan outside the city of Helsingborg. The Svinbådan lighthouse is very popular among cormorant birds all the year round. The initial effect of the gas cannon was very good, according to Martin Samuelsson captain of the service ship Scandica. After some time the promising initial effect diminished and the gas cannon was later decommissioned. The cormorant birds displayed a clear and indisputable habituation effect.

3.3 Sound scarers

The Swedish Maritime Administration has tested several bird scarers that uses sound effects, such as bird distress calls, to repel birds. 6 different test sites was identified and are displayed in table 1 below. All of them, except the first one, are a US made product named Bird Gard Super Pro. The Bird Gard Super Pro plays bird distress calls at random intervals and at random frequencies. Unfortunately the usage of these products was not very well documented which made it difficult to reach a solid conclusion.

As can be observed in table 1 the data is incomplete and inconsistent making it impossible to determine whether the Bird Gard Super Pro is effective or not. Therefore another experiment was carried out, using a slightly modified Bird Gard Super Pro at the lighthouse Flintrännan 16 near the Öresund Bridge. The Bird Gard Super was modified to allow it to be remote controlled by mini-call and GSM Internet. It was therefore possible to not only switch the unit on and

Table 1: Sound scarers

Device	Lighthouse	Location	Effect	Time period	Installer
Unknown	Flintrännan 7	Öresund	None	Unknown	Scandica
Birdgard SP	Fladen	Halland	Unknown	October 2007	Scandica
Birdgard SP	Falsterbo rev	Falsterbo	Unknown	November 2007	Scandica
Birdgard SP	Revanschen	Sandhamn	Unknown	Unknown	Baltica
Birdgard SP	Bredgrund	Landsort	Unknown	Unknown	Baltica
Birdgard SP	Västerbådan	Västervik	Yes	November 2007	Arkö 833

off but also to change the type of bird distress called being played. Further a surveillance camera was installed to monitor the experiment close by.

After two months of testing, the first month without using the Bird Gard Super Pro and the second month with the unit turned on, the cormorants completely ignored the distress calls being played. Even attempts to manually scare off the birds, by changing the sound used by Bird Gard Super Pro, failed. Using the surveillance camera some moving pictures with sound was recorded from the test site. The film displayed birds resting on the lighthouse while the sound scarer operated at maximum efficiency, apparently uninfluenced.

It is therefore considered very unlikely that sound scarers are an effective way of bird control on lighthouses.

3.4 Lasers

The French company Desman markets and manufactures lasers designed specifically for bird control. An example of a Desman bird control laser is shown in figure 4.



Figure 6: A Desman laser

Inquiries was sent to Desman reference customers listed on their web page asking about their experience of the Desman laser. Two answers was received, one from the U.S. Department of Agriculture (UDA) and one from Bayerische

Landesanstalt für Landwirtschaft (BLL) in Germany. Both UDA and BLL invested in a laser to conduct their own experiments on its possible use as cormorant scarer.

Doctor Manfred Klein at BLL reveals that the experiment with the Desman laser has been aborted and that BLL classifies this technique to be ineffective. BLL used the Desman laser on breeding cormorants and was unable to make them abandon their nests.

Andy Radomski, field biologist at UDA, has had a slightly different experience of the Desman laser. According to Andy Radomski the laser was indeed successful at scaring of cormorants, at least temporarily. But despite this initial success UDA does not consider the Desman laser to be an effective solution since the effect is not long lasting and too local for their intended use.

4 Electromagnetism

Anecdotal evidence from employees at the Swedish Maritime Administration suggested that electromagnetism from mobile phone base stations installed at lighthouses seemed to deter cormorants. The information regarded two different lighthouses both with mobile phone base stations installed, Flintrännen 6 lighthouse in Öresund and the Svinbådan lighthouse outside the city of Helsingborg.

For such an effect to be plausible birds must at least be able to perceive the electromagnetism radiated from the mobile phone base stations.

4.1 Birds and electromagnetism

It is confirmed that many birds are able to use magnetic radiation as a source of information while navigating [Wiltchko, 1968]. The earth's magnetic field that birds use while navigation is a very weak static magnetic field. This is in contrast to the oscillating electromagnetic field emitted from the mobile phone base stations used at the lighthouses in question. The base stations at Flintrännen 6 and at the Svinbådan lighthouse only operates at the 1800Mhz band.

How birds are able to use information gathered from the earth's magnetic field is not fully understood. Two completely different receptor systems seems most plausible [Ritz, 2004]. One of them includes the ferromagnetic mineral magnetite. Magnetite happens to be a good absorber of electromagnetic radiation for frequencies between 0.5 to 10GHz [Kirschvink, 1996].

Scientific literature regarding a possible link between birds behavior and exposure to electromagnetic fields was studied. The study yielded little or no support for such an effect. Only one article claiming such an effect was found [Everaert, 2007]. This article claimed that sparrows tend to avoid nesting close to mobile phone base stations.

4.2 Lighthouses with mobile phone base stations

The Flintrännen 6 lighthouse is one of several lighthouses that constitute the Flintrännen international channel in Öresund. This particular lighthouse should according to information received have far less visiting cormorants than its nearby neighbors. Presumably due to the presence of a mobile phone base station.

An attempt to compare the number of visiting cormorants at Flintrännen 6 with the lighthouse Flintrännen NO (only 2,3 nautical miles from Flintrännen 6) was performed. A distinct difference in amount of faeces between these two lighthouses was noticeable, Flintrännen 6 being the one having significantly less faeces.

Further, cormorant birds on Flintrännen 6 was monitored with a surveillance camera connected to the Internet via wireless 3G technology. During several months of surveillance the camera only caught a handful of birds visiting the lighthouse, far less than expected in this by cormorants densely populated area.

The other lighthouse equipped with a mobile phone base station, Svinbådan, was located further out to sea than Flintrännen 6. The mobile phone base station resembled the one installed at Flintrännen 6. Martin Samuelsson, captain of the service ship Scandica and a frequent visitor to Svinbådan, stated that cormorants are a very much common sight at this lighthouse.

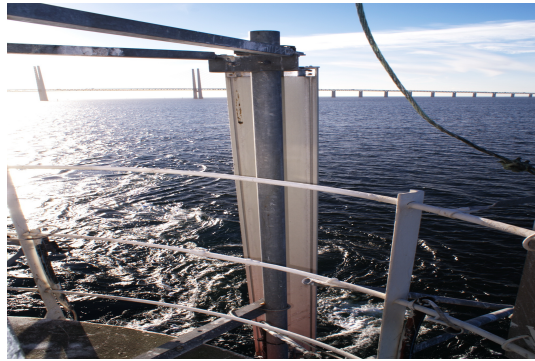


Figure 7: A mobile phone base station at Flintrännen 6

5 Results and discussion

5.1 Scarecrows

The evaluation of previously tested scarecrows yielded a poor result. First of all mocking birds, in this case plastic eagle owls, proved to be completely ineffective at keeping cormorants away from lighthouses.

A gas cannon initially showed promising results but it soon became obvious that this solution was not time constant. The cormorants were habituated to the gas cannon quite rapidly and the cannon was dismantled.

Also scarecrows using bird distress calls were tested and dismissed. The tested model, Bird Gard Super Pro, proved to be unable to scare cormorants, at least after 30 days of consistent use. Whether or not the Bird Gard Super Pro had an initial effect that decayed with time was not fully understood.

Finally the use of laser scarecrows was examined to some extent. The result of that examination was discouraging.

As cormorant expert Henry Engström at Uppsala University pointed out, it does look hard finding a way to scare the cormorants away from lighthouses. Cormorants appear to benefit from resting on lighthouses just a little bit too much for us to force them to leave. The fact that they do not even abandon a lighthouse equipped with a powerful gas cannon seems to support this assumption.

Shared for all of the tested methods are their inability to disperse birds in a time consistent way. Cormorants tend to get used to scarecrows installed on lighthouses, they tend to habituate. Contributing factors to this habituation effect are presumed to be partly that lighthouses constitute a favorable place for cormorants and also that lighthouses are more or less completely isolated from human presence.

The tests performed do however have some flaws. It is possible that a mocking bird resembling a sea eagle instead of an eagle owl would be more successful. This since a genuine sea eagle poses a real threat to a cormorant which an eagle owl does not. Although even if the initial effect possibly could be improved it is assumed to be very likely that the cormorants would habituate in the long run.

5.2 Electromagnetism

Whether or not electromagnetism from mobile phone base stations actually deter birds is not fully understood. Observations from Flintrännen 6 and the fact that birds are capable of perceiving at least some magnetic fields seem to support this assumption. Although cormorants do not seem to be too disturbed by electromagnetism since cormorants have been spotted at the Svinbådan lighthouse.

More data needs to be collected before it is possible to reach any solid conclusions.

6 Future areas of interest

For future work I suggest less focus on scaring techniques and more on alternative types of ideas. The Great Cormorant is a relatively large seabird that has webbed feet and it is not particularly agile while airborne. These characteristics could possibly allow measures that prevents cormorants from landing on lighthouses. Possible measures could include bird spikes and trip wires. If such a measure succeeds it would be unlikely to display any habituation effect.

A lighthouse is generally a building with few suitable landing spots for cormorants. Most parts of a lighthouse's surface are vertical and therefore completely inaccessible for birds. Preventing cormorants from accessing lighthouses with lets say birds spikes is not really a problem. The problem is doing so while still allowing access for service personnel.

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