

# The effects of varying the number of Cormorant Licences in the early years of a new strategy

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## Summary

A previous paper has examined the consequences of increasing the number of licences that might be issued to remove cormorants on the size of the winter cormorant population. This paper expands on this previous work, examining the consequences of varying the number of licences issued in the early years of any new strategy, and the strengths and weaknesses of each approach.

Within reasonable limits, varying the number of licences issued in the early years of any new strategy simply alters the number of years the population takes to reach its new, lower equilibrium.

Gradually increasing the number of licences increases the time it takes for the population to stabilise. Increasing the number of licences in the early years speeds up the time taken for the population to reach its new equilibrium, but carries the risk of the population overshooting this target.

A gradual increase would be easier to implement and would provide an added margin of safety.

A more rapid increase would provide quicker benefits, would assist with future modelling, but would carry risks of overshooting the target, would require more careful monitoring and might cause problems amongst applicants at the time when the number of licences is reduced.

## Background

A previous paper has described the likely response of the English cormorant population to different levels of licenced removal. This model predicts that increasing the number of licences issued to 2,000 per annum would suppress the population to a level lower than currently observed, but that this would be stable and unlikely to lead to long-term declines. The full effects of such a policy would take around five years to be fully apparent.

This note applies the same model to examine the consequences of changing the number of licences issued in the early years of a new strategy, either gradually increasing the number of licences issued to the 2,000 level, maintaining a constant level of 2,000, or exceeding the 2,000 figure in the early years and then lowering the number.

## Methods

The model used is the same as used in the earlier paper, readers are referred to that for details of the methodology.

The most commonly accepted figure for the number of cormorants currently wintering in England is 17,000. This is the figure assumed to be the stable population in this exercise.

## Results

Four scenarios were examined.

Firstly the number of licences were increased gradually, with 500 in the first year, followed by 1,000, 1,500 and 2,000 in subsequent years, with 2,000 annually thereafter. In this scenario the population stabilised at a new equilibrium of 13,800 after 8-10 years, a figure 19% lower than that currently observed.

Secondly, the number of licences were kept at a constant figure of 2,000 per annum from the first year. In this case the population still stabilised at 13,800 but reached this new equilibrium within 5 years.

Thirdly, 3,000 licences were issued in each of the first two years, with this number being reduced to 2,000 thereafter. In this scenario the population still stabilised at a figure of 13,800 and was close to this figure within two years.

Lastly, 3,000 licences were issued for each of the first three years, with this number being reduced to 2,000 thereafter. In this case the population was reduced to 13,200 by year three, and then took a number of years to recover to a level of 13,800.

## Discussion

An increase in the number of licences issued has already been predicted to suppress the size of the wintering cormorant population, with this effect taking five years to be fully apparent. Altering the number of licences issued in the first years within reasonable limits alters the number of years that the population takes to reach its new equilibrium rather than affecting the level at which the population equilibrates. Examples are given where the same level of population reduction can be observed after two, five or ten years depending on the number of licences issued in the first few years of a new strategy. However, they also illustrate the possibility of overshooting the level of population reduction by issuing too many licences in the early years, although the population would still recover once the number of licences was reduced.

Figure 1.

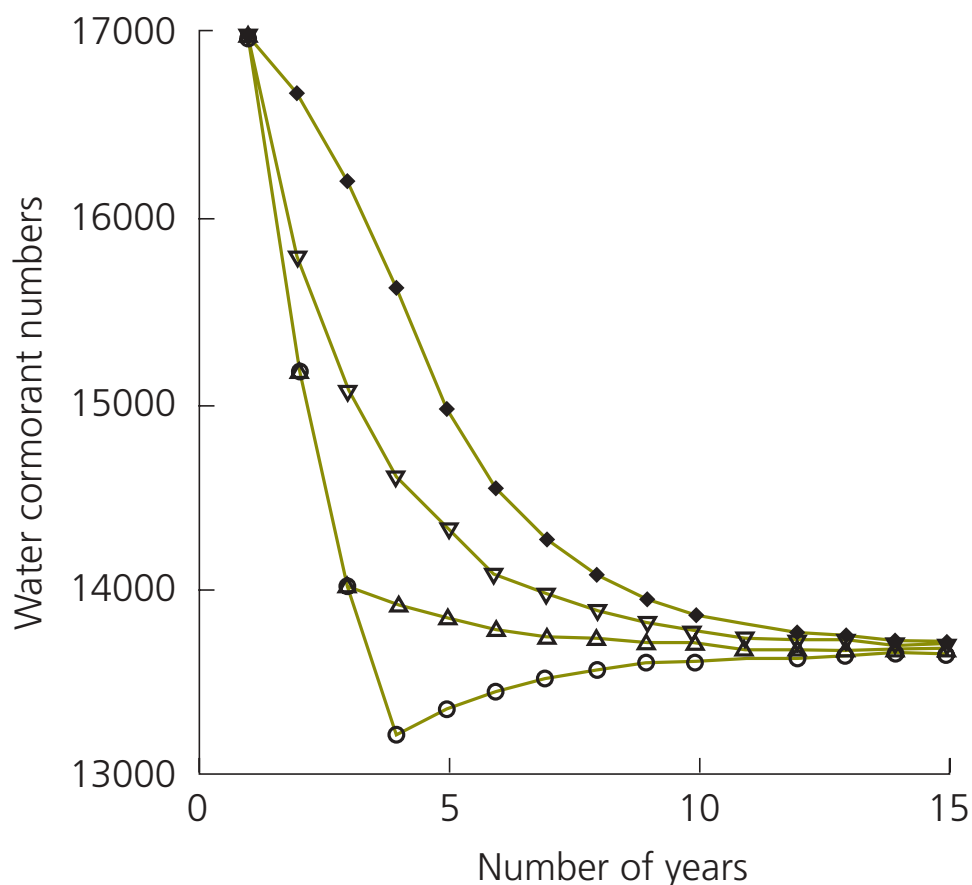
Model predictions of the effects of different licencing regimes on the number of cormorants wintering in England. Four scenarios are presented.

Top line – small diamonds – a gradual increase in licences, 500, 1,000, 1,500, 2,000 in the first four years, followed by 2,000 per annum thereafter.

Second line – inverse triangles – 2,000 licences per annum.

Third line – triangles – issuing 3,000 licences in each of the first two years, 2,000 per year thereafter

Bottom line – circles – issuing 3,000 licences in each of the first three years, 2,000 per year thereafter.



There are advantages and disadvantages to each strategy. A gradual increase in the number of licences would be easier in administrative terms and would provide an added margin of safety should there be unexpected consequences of the new strategy. However, it would lead to delays in resolving the problems targeted by the new policy.

Increasing the number of licences issued in the first years of a new policy would increase the speed with which the benefits of the new policy would be apparent. A rapid change in the population would also assist modelling of the response, a large change providing a better test of the models predictions against the inevitable background of year to year variation. This strategy would also have associated risks, such as reducing the population by more than the desired amount, and the population then taking some years to recover. Were such a strategy to be considered it would be important to have adequate monitoring in place and annual review of the number of licences to ensure an adequate margin of safety. It is also possible that this strategy would be unpopular with licence applicants at the time when the number of licences is reduced, although cormorant numbers will also have been reduced by this stage.

Lastly, it is important to reiterate the assumptions and shortcomings of modelling, as discussed in the previous paper.

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