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Research information note

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Effects of reductions in organic and nutrient loading on bird populations in estuaries and coastal waters of England and Wales. Phase 2 report

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Introduction

Under the Urban Waste Water Treatment Directive (1991), all coastal discharges above a certain size must have secondary treatment installed, with the aim of reducing organic loading and to a lesser extent the nutrient loading to the receiving water. In addition, for outfalls affecting bathing beaches, the Bathing Waters Directive (1976) may require further treatment to be implemented. Discharges of this nature may provide food for birds either as directly edible matter or by organic-enriching sediments and thus increasing the invertebrate (and algal) biomass. The implications of these directives on coastal waterbirds, in particular at sites classified as Special Protection Areas (SPAs), were considered in this study.

What was done

This report presents the second phase of a study. The first phase of the work reviewed the importance of waste water discharges in providing food for waterbirds and assessed how changes to their treatment might affect bird populations. The work identified species most likely to be at risk and sites where waterbirds may have been or may still be affected by the implementation of the directives.

This second phase report investigated whether the numbers of waterbirds at individual sites may be related to the quality of effluent from individual discharges or whether the scale of change in species' populations may be related to the scale of change in the quality of the receiving water of the site as a whole.

The report considered 16 SPAs or parts of SPAs (identified in the Phase 1 work) where past changes in waste water treatment over the period 1990 to 2000 could have impacted upon waterbird populations or where changes to treatment were planned to occur between 2000 and 2005. Box-modelling was undertaken for each of the 12 sites in order to give an indication of the average Biochemical Oxygen Demand (BOD) concentration in the receiving water before and after changes in waste water treatment. These results were compared with the corresponding Waterbird count data obtained from the Wetland Bird Survey (WeBS) Core Count Scheme, for each of the 12 sites.

Results and conclusions

Plots indicated that there were declines in waterbird indices on all of the study sites, but that there was no consistent pattern of decline following improvements to waste water discharges. In a number of cases, declines began prior to the implementation of improved treatment or matched regional trends in

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the species' populations. Initial analyses investigated whether waterbird indices might be positively related to the concentrations of BOD and other variables in the effluent at sites only affected by one main discharge. Results for the three sites where analysis was possible indicated no consistent relationships between waterbird numbers and these variables.

The main analyses investigated whether, for individual species, the scale of change in their numbers following improvements to waste water treatment was related to the scale of change in BOD concentration for each site. Again, there were no significant relationships for any species, either using site indices or when taking into account regional change (so as to account for factors not operating at the site-level). The analyses did indicate, however, that on the sites with the greatest decreases in BOD concentration, a significantly greater proportion of species declined following improvements to waste water discharges.

There were a number of suggestions relating to why the study was unable to link changes in water quality with bird numbers. These include:

- At some sites, some species might have benefited from the improvements in water quality.
- Other factors operating at the site-level may be masking changes the effect of changes in water quality.
- Many of the improvements to waste water treatment have only occurred relatively recently and it is possible that there has not been sufficient time since for the impacts of these changes to become apparent.

Finally, it was concluded that in order to further investigate the link between bird numbers and water quality, it would be necessary to look at changes in the distributions and numbers of waterbirds within sites and to be able to relate these to changes in food resources and preferably also the distribution of organic matter discharged from outfalls.

English Nature's viewpoint

It was important to undertake assessments to test the conceptual model that bird numbers will be impacted by reduced organic loadings. If there had been strongly defined relationship found in this study, then the ability to develop predictive models would have been greatly improved, and future environmental impact assessments would have been better informed. Some interesting relationships/patterns were beginning to develop and it is vital that we continue to evaluate the long term datasets being generated by the WeBs count in relation to continued improvement in water quality through compliance with European directives.

Selected references

BURTON, N.H.K., and others. 2002. *Effects of reductions in organic and nutrient loading on bird populations in estuaries and coastal waters of England and Wales. Phase 1 Report*. BTO Research Report, No. 267 to English Nature, the Countryside Council for Wales and the Environment Agency. Thetford: BTO.

Further information

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