

NUMBERS OF WINTERING WATERBIRDS ON RIVERS IN EASTERN ENGLAND

Chris F. Mason and Sheila M. Macdonald

Department of Biological Sciences, University of Essex,
Colchester CO4 3SQ, United Kingdom.
Email: masoc@essex.ac.uk

*Waterbirds were counted on three occasions during the winter of 1999-2000 on 22 1-km reaches of river in north Essex and south Suffolk, eastern England. Fourteen species were recorded but only five were frequent: Little Grebe (*Tachybaptus ruficollis*), Mute Swan (*Cygnus olor*), Mallard (*Anas platyrhynchos*), Moorhen (*Gallinula chloropus*), and Coot (*Fulica atra*). Mallard was the most numerous species. All five species except Little Grebe congregated at places where they were fed by the public. Only Little Grebe showed an increase in numbers over the winter. Of eight habitat variables measured, only river width was consistently related positively, to waterbird numbers. Despite low densities, it is estimated that riverine populations of Little Grebe, Mute Swan, Mallard and Moorhen in the study area are likely to be larger overall than those on the main reservoirs and estuaries in the catchment.*

Key Words: rivers, waterbirds, Mallard, Mute Swan, Moorhen, Coot, Little Grebe

There is a long history in the United Kingdom of monitoring populations of wintering waterbirds in estuaries and on the larger inland standing waters, e.g. the Wetland Bird Survey (WeBS) (Cranswick *et al.* 1996). In contrast the wintering birds using flowing waters have received little attention.

There are some 31,000 km of main river (i.e. maintained by the Environment Agency) in England and Wales (Environment Agency 1996), so even if local waterbird populations are small, the cumulative total could be significant. This

may be especially so for Mallard *Anas platyrhynchos*, which is known to be widely distributed in winter but which has been shown by WeBS monitoring to have a population index that has declined by up to 40% over the last ten years (Pollitt *et al.* 2000).

This paper reports on a small study of wintering waterbirds on rivers in eastern England and compares numbers with those wintering on reservoirs and estuaries within the study catchments. The significance of rivers for wintering waterbirds is discussed.

Methods

The study area comprised the catchments of the Rivers Gipping, Stour, Colne, Blackwater and Chelmer, a total of 803 km of main river channels which drain 3,326 km² of south Suffolk and north Essex, in eastern England. The rivers are typical of the East Anglian region and all are relatively small. Within the river system, 22 reaches of length 1 km, adjacent to a road bridge access point, were selected using random numbers from 85 sites offering suitable access. They were walked by one or both authors in the morning on three occasions: early winter (late October-early December 1999), mid-winter (January 2000) and late winter (February 2000). All waterbirds were counted in the river channel and on the banks up to 3 m back from the water on both outward and return journeys. The larger of the two

counts for each species was taken as the number of birds present.

During the first survey of each reach a number of habitat features were recorded. These were the width of the reach (the average of the distance between the banks at 100 m intervals, estimated by eye), the number of trees less than and greater than 5 m tall on both banks, the length of banks edged by a thick (>1 m wide) or thin (<1 m wide) band of marginal vegetation, and the length of both banks fringed with a thick (>1 m wide) or thin (<1 m wide) belt of emergent macrophytes (marginal and emergent vegetation was estimated by eye at 50 m intervals). The land-use (grass, tilled, or other) adjacent to the watercourse was also recorded as a length along both banks. The weather was mild throughout.

For statistical analyses data were log (n+1)-transformed to give an approximately normal distribution (Gilbert 1973; Heath 1995).

Table 1. Total numbers and densities (geometric mean km⁻¹) of waterbirds recorded on 22 1 km reaches of five rivers in eastern England in three periods of the 1999-2000 winter.

Species	Numbers of Waterbirds						Anova $F_{2,63}$	
	Early Winter		Mid Winter		Late Winter			Range/Reach
	Total	Mean	Total	Mean	Total	Mean		
Little Grebe <i>Tachybaptus ruficollis</i>	1	0.03	12	0.35	12	0.42	0 - 4	4.57, $P < 0.05$
Mute Swan <i>Cygnus olor</i>	36	0.86	29	0.70	35	0.94	0 - 8	0.17, ns
Mallard <i>Anas platyrhynchos</i>	480	3.75	523	4.91	534	5.70	0 - 190	0.21, ns
Moorhen <i>Gallinula chloropus</i>	127	4.14	130	2.95	170	4.35	0 - 41	0.59, ns
Coot <i>Fulica atra</i>	15	0.29	18	0.26	17	0.20	0 - 14	0.07, ns

Species recorded less frequently (total number and arithmetic mean km⁻¹ in brackets) were: Grey Heron *Ardea cinerea* (2, 0.030) Emperor Goose *Anser canagicus* (1, 0.015), Canada Goose *Branta canadensis* (10, 0.152), Egyptian Goose *Alopochen aegyptiacus* (5, 0.076), Muscovy Duck *Cairina moschata* (25, 0.379), Chiloe Wigeon *Anas sibilatrix* (1, 0.015), Goosander *Mergus merganser* (1, 0.015), Water Rail *Rallus aquaticus* (1, 0.015), Green Sandpiper *Tringa ochropus* (1, 0.015).

Results

A total of 14 species was recorded (**Table I**). Five species were feral or escapes from captivity. Only five species were recorded in all three surveys. The commonest was Mallard. Of the total of 1,537 Mallard recorded, 16.7% had a typical plumage characteristics, indicating a feral origin. Moorhen, with a total of 427 individuals, was the next commonest species.

The distribution was clumped. Five reaches associated with villages, where waterbirds were fed by the public, held 85% of the Mallards, 54% of Mute Swans and 36% of Moorhens. Those species taking food from the public tended to occur together, as demonstrated by correlations between summed populations at sites over the three surveys. Mallard numbers were significantly greater on reaches where Moorhen ($r=0.60$, $P<0.01$) and Mute Swan ($r=0.70$, $P<0.01$) numbers were greater, while Moorhen numbers were significantly greater on reaches where Coot ($r=0.65$, $P<0.01$) and Mute Swan ($r=0.51$, $P<0.05$) were more numerous. Little Grebe, which was not seen to take food provided by the public, showed no significant correlations with other species.

To examine seasonal population trends, differences in abundance between survey periods for the five most numerous species were compared using analysis of variance (**Table I**). There was a significant difference only for Little Grebe, where a mean significance difference test showed more birds present in the third winter period than in the first.

The relationships between waterbird abundance (total count over the three periods) and habitat variables were examined by correlation. Mallard and Mute

Swan numbers were greater on wider reaches ($r=0.51$, $r=0.46$, respectively, $P<0.05$) and where emergent vegetation was thicker (Mallard $r=0.55$, $P<0.01$; Mute Swan $r=0.50$, $P<0.05$). Numbers of Moorhen, Coot and Little Grebe showed significant correlations only with width ($r=0.60$, $P<0.01$; $r=0.51$, $P<0.05$; $r=0.43$, $P<0.05$, respectively).

Discussion

Only five species occurred with any regularity on reaches of river in the study area. The habitat variables measured explained little of the variation in numbers of waterbirds between sites. The most consistent was width, more waterfowl occurring in the wider, lower reaches of rivers. In these rivers which rise in the lowlands and are managed from source there is no consistent pattern of change downstream, other than width and the volume of water flowing. The riparian and within-river habitats are primarily influenced by management (Harper *et al.* 1995; Mason 1996). Thick emergent vegetation was important to Mallard; presumably it traps floating matter, a food source of dabbling ducks (Holmes & Bethel 1972).

Of most importance were localities close to villages where waterbirds are routinely fed. The congregation of birds at feeding places may explain the lack of changes in numbers over the winter. Only Little Grebes, which do not associate with humans, increased over the winter period, possibly as birds vacated small, still waters which temporarily froze over during cold snaps. The cultural significance of these feeding places should not be ignored for they provide the first exposure of many young children to wildlife. Simple

Table 2. A comparison of estimated wintering populations of waterbirds on rivers (803 km) with those on reservoirs and estuaries (WeBS sites; mean total, November-February 1997-98) in the study area.

	Rivers	WeBS Sites
Little Grebe	214	75
Mute Swan	669	470
Mallard	3,844	2,890
Moorhen	3,062	290
Coot	200	3,924

interpretation boards at these locations, identifying the species and providing a conservation message, may enhance and reinforce the experience.

To assess the significance of these populations of waterbirds on rivers in the catchment area, numbers were compared with those recorded on the main reservoirs and estuaries during WeBS counts. The reservoirs within the study catchment comprised Hanningfield, Abberton, Ardleigh and Alton Water. The estuaries comprised the Blackwater, Colne, Hamford Water, Stour and Orwell. The overall mean counts (log transformed data) of waterbirds over the three river surveys were multiplied by the length of main river (803km) to give an estimate of total population. These were compared with the mean total WeBS counts (November to February, inclusive) for the above sites for the winter 1997-98, the latest year for which detailed published data are available (Goodey & Grimwade 1997; Goodey *et al.* 1998; Lowe 1998, 1999). The results suggest that rivers may hold substantially larger populations of Little Grebe, Mute Swan, Mallard and Moorhen than these WeBS sites, though

the Coot numbers are relatively small (**Table 2**). The population of Mallard, a declining species currently causing some concern, on the rivers is likely to be more than twice that counted at WeBS sites.

The study area also holds a considerable number of small water-bodies which are not routinely counted. These include gravel pits and an increasing number of farm irrigation reservoirs. Within the study area there are 261 farm reservoirs licensed to abstract water for winter storage (Environment Agency, pers. comm.). Populations of waterbirds on these, especially Mallard, are likely to significantly further inflate the totals within the catchment.

In conclusion, the rivers within the study area hold low densities of a limited assemblage of waterbirds during the winter. However, because of the length of watercourse within the catchments, the total number of these dispersed populations is significant when compared with those concentrations at sites which are routinely monitored.

References

- Cranswick, P.A., Kirby, J.S., Salmon, D.G., Atkinson-Willes, G.L., Pollitt, M.S. & Owen, M. (1996). A history of wildfowl counts by WWT. *Wildfowl* **47**: 217-229.
- Environment Agency (1996). *The Environment of England and Wales: a Snapshot*. Environment Agency, Bristol.
- Gilbert, N (1973). *Biometrical interpretation*. Clarendon Press, Oxford.
- Goodey, A. & Grimwade, S.J. (1997). *The Essex Bird Report 1997*. The Essex Birdwatching Society.
- Goodey, A., Grimwade, S.J. & Mullins, A. (1998). *The Essex Bird Report 1998*. The Essex Birdwatching Society.
- Harper, D., Smith, C., Barham, P. & Howell, R. (1995). The ecological basis for the management of the natural river environment. In: (eds.) D.M. Harper & A.J.D. Ferguson. *The ecological basis for river management*. Wiley, Chichester pp 219-238
- Heath, D. (1995). *An introduction to experimental design and statistics for biology*. UCL Press, London.
- Holmes, J.C. & Bethel, W.M. (1972). Modification of intermediate host behaviour by parasites. In: (eds.) Canning, E.U. & Wright, C.A. *Behavioural aspects of parasite transmission*. Academic Press, London pp 123-149
- Lowe, G. (1998). *Suffolk Birds* **47**. Suffolk Naturalists' Society, Ipswich.
- Lowe, G. (1999). *Suffolk Birds* **48**. Suffolk Naturalists' Society, Ipswich.
- Mason, C.F. (1996). *Biology of freshwater pollution*. Longman, Harlow.
- Pollitt, M.S., Cranswick, P.A., Musgrove, A.J., Hall, C., Hearn, R.D., Robinson, J.A., & Holloway, S.J. (2000). *The Wetland Bird Survey 1998-1999: Wildfowl and Wader Counts*. BTO/WWT/RSPB/JNCC.

