

## Sawbills 1987

### Title

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### Description and Summary Results

The first confirmed British breeding records of Goosander *Mergus merganser* were in 1871 in Perthshire and Argyll, although breeding had been suspected earlier on both the Northern and Western Isles. By the end of the nineteenth century, it was not uncommon in Argyll, the north-west Highlands, the Moray Basin and along the River Tay. Breeding was first confirmed in England in Northumberland in 1941 and in Cumbria in 1950. Further increases in these counties occurred until the mid-1960s, but there appeared to have been a decrease in the population in NW Scotland, possibly due to persecution to protect fish stocks. From the mid-1960s onwards, the southern expansion continued into Durham, NW Yorkshire and N Lancashire. By the time of the 1968-1972 Breeding Atlas, it was recorded breeding in Cardiganshire. Since then, major increases have occurred in populations in northern England, southern Pennines, SW England and especially Wales and these have spread into Shropshire and Herefordshire. There have been few breeding records from Ireland, mostly in Co. Donegal. By the time of the 1988-1991 Breeding Atlas it was widely scattered through Scotland and northern England, a few in the south Pennines and SW England and widespread in Wales with an estimated 150 pairs.

The Red-breasted Merganser *M. serrator* has been resident in Britain since at least Neolithic times. During the first half of the 19th Century, it bred only in western Scotland, no further south than Loch Awe in Argyll, but by the late 19th Century it was found throughout the Scottish mainland north of the Clyde and Forth valleys, and occasionally further south. Breeding was first recorded in England in 1950 (Cumbria), followed by rapid expansion to N Lancashire and NW Yorkshire. The first Welsh breeding record came from Anglesey in 1953, and from mainland Wales in 1957. By the 1968-1972 Breeding Atlas they were breeding in the Derbyshire Peak District but since then there has been a continued increase in Derbyshire and Wales but a thinning of the populations in central and SW Scotland. In Ireland there have also been declines as the population has retreated towards the north and northwest coasts.

The rapid range expansion of both species was accompanied by increasing calls for action to control both species because of potential damage to stocks of Atlantic Salmon *Salmo salar* and migratory (Sea) Trout *S. trutta*. Both sawbill species are afforded full protection throughout Britain but licences for control can be issued where there is evidence of serious damage to fisheries -- during the 1990s the number of birds culled each year in Scotland was in the hundreds, and in England and Wales in tens. Young salmonids can form a high proportion of the diet in certain situations, but whether such predation has a detrimental impact on game fisheries is uncertain. This has led to increased pressure, and indeed action, towards reviewing both the legislation surrounding licensing and its practical application, and the potential conflict of interests has led to the species being identified as a conservation priority.

Hence a national survey was carried out in 1987 following earlier work carried out in Scotland in 1984 and 1986. And similar reasons were put forward for a subsequent survey in 1997.

In 1987 just over 9300km of river were surveyed: 5056km in spring and 4273km in summer. This comprised 1138 individual stretches, 623 in spring and 515 in summer (median 7km in length). Coverage was uneven but all regions holding significant sawbill populations were covered although no stretches were covered in Devon and only a few in the southern Pennines where the species are known to occur.

Goosanders occurred more densely on wider stretches, at lower altitudes and with shallower gradients, and there were more with more bankside cover in the summer period. Red-breasted Mergansers were commoner at lower elevations.

Variation in density was large and there was significant variation among regions for each species in both spring and summer periods, but densities of the two species were not associated with each other. In spring Goosander densities were highest in the Borders and Southern Uplands of Scotland and NW England, and lowest in west Wales and the Scottish Central Lowlands. Merganser densities were highest in the NW Highlands, western Scotland and west Wales, and low elsewhere.

Summing regional totals gave a national figure of 2625 adult male Goosanders (95% confidence limits 2333-2890) and 3710 redheads (95% limits 3272-4072), and 826 adult male (562-1051) and 748 redhead (562-964) Mergansers, with the large count of redhead Goosanders suggesting a sizeable population of immature, non-breeding birds. (Note that all figures refer only to birds on rivers and those on, for example, lochs, reservoirs or the coast were not included. The majority of Goosanders do breed on rivers, so the numbers recorded during the survey are a reasonable estimate of the national population. However most Red-breasted Mergansers breed in coastal areas so the estimate represents only the riverine part of the total population.)

Surveyors also recorded the numbers of Cormorants *Phalacrocorax carbo*, Grey Heron *Ardea cinerea* and Kingfisher *Alcedo atthis*.

### **Methods of Data Capture**

Organizers were asked, where possible, to concentrate fieldwork effort onto covering a small number of complete river systems (from mouth to headwaters and including tributaries) rather than a larger number of rivers in lesser detail. In addition, teams of EARTHWATCH volunteers were deployed in otherwise poorly covered regions of Scotland and Wales. No formal sampling strategy was adopted, and regional boundaries were based on hydrometric areas.

Survey work was carried out in two periods: spring (1 March to 30 April) to record the numbers and distribution of potential breeding pairs, and summer (1 to 31 July) to record the number and distribution of family parties (and non-breeders). One visit was to be made in each period. Observers selected a river stretch, divided it into 1km sections marked on a 1:50000 map, and walked each section recording adult male, "redhead", and young Goosanders and Red-breasted Mergansers. ("Redhead" comprises males in their first summer and all females and which are difficult to distinguish in the field.)

Broad-scale habitat information was recorded for each 1km section of a river stretch, comprising: the average width of the river (<5m, 5-10m, 10-30m and >30m); the

predominant water type (smooth, smooth and riffle, riffle and white water, and white water); the extent of cover on the banks (no tree cover, <10%, 10-50%, 50-90% and >90%) and whether it was coniferous or deciduous. Elevation and grid reference were recorded at the start and end of each river stretch. Mean values of each variable were calculated for each stretch of river, and each 1km section of river was assigned the mean elevation and gradient of the whole stretch.

### **Purpose of Data Capture**

The principal aims were to provide data on numbers, distribution, and broad habitat use, of breeding Goosander and Red-breasted Merganser on rivers throughout Britain, both to provide information on their status and biology and to shed light on their potential role in regulating fish stocks.

### **Geographic Coverage**

The aim was a complete survey of the UK. Surveys were on stretches of suitable rivers in the range of the species divided into 1km sections.

### **Temporal Coverage**

The spring and summer of 1987. Two visits were requested to each stretch, the first in March or April to find adults and the second in July to find family parties and non-breeding birds.

### **Other Interested parties**

Many fieldworkers were BTO volunteers but many of the more remote and difficult to cover areas were surveyed with the help of volunteers from the Center for Field Research (EARTHWATCH) USA who also provided their own finance.

Other funding came from the Department of Agriculture and Fisheries in Scotland (DAFS) which is now part of the Scotland Office Agriculture and Fisheries Department. Part of the project too was carried out under contract from the Joint Nature Conservation Committee, on behalf of English Nature (now Natural England), the Countryside Council for Wales (now Natural Resources Wales) and Scottish Natural Heritage, and under a contract from the Department of the Environment for Northern Ireland.

### **Organiser(s)**

Steve Carter

### **Current Staff Contact**

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## **Publications**

The main report of the survey is:

Gregory, R.D., Carter, S.P. & Baillie, S.R. 1997. Abundance, distribution and habitat use of breeding Goosanders *Mergus merganser* and Red-breasted Mergansers *Mergus serrator* on British rivers. *Bird Study* 44: 1-12.

The survey was noticed in *BTO News* numbers 147, 148 and 152.

## **Available from NBN?**

No.

## **Computer data -- location**

BTO Windows network central area.

## **Computer data -- outline contents**

The 1987 survey directory contains: the original data as input and a file of processed data (sorted to a usable form), and the SAS programs used to analyse the data.

(There is also a copy of the data with the 1997 data, and was evidently used to compare the two surveys. However there is a very small discrepancy in the number of lines of data.)

## **Computer data -- description of contents**

The processed data files contain:

River code -- each data card was given a unique 8 figure code number; Coverage code; Grid reference of start and end points; Altitude of start and end points; Date of coverage; details of river sections, water type and bankside vegetation; counts of Goosanders, Mergansers, unidentified sawbills, Cormorants, Herons and Kingfishers.

## **Information held in BTO Archives**

2 Archive Boxes containing data, 2 Transfer Cases containing analyses and letters; 1 folder of maps. (There are also 3 Transfer Cases containing data and information from the preliminary work in Scotland carried out 1984-1986.) All data have been scanned.

## **Notes on Access and Use**

## **Other information**

## **Notes on Survey Design**

## **Specific Issues for Analysis**

Estimates of numbers were based on extrapolation of regional densities by plumage class (ie adult males and redheads) from the spring survey period to all potentially suitable rivers within the study regions. River lengths were measured from standard 1:400000 base maps and included all illustrated rivers and tributaries (as this information was not available elsewhere). Extrapolation involved multiplying bird densities in plumage classes by total river lengths within regions and summing these figures across regions to derive national estimates. However, bird densities varied predictably with river width and so we calculated both regional densities and river lengths by width category. The latter was only possible for a subset of 32 rivers for which we had recorded river width over much of the length. River lengths within width categories for the remaining 299 rivers were estimated as the average proportions across the index 32 rivers, the assumption being that these 32 rivers were a random sample with respect to the distribution of width categories. Extrapolations were thus based on density estimates and river length availability within width categories. Confidence intervals on the estimates were obtained by a bootstrap method. Population estimates were based on the spring survey, rather than the summer, as these densities are likely to provide the best measure of the numbers breeding. From April onwards, female sawbills begin incubation and are therefore difficult to locate, and by late spring/early summer the majority of male Goosanders and Red-breasted Mergansers leave the breeding grounds to moult elsewhere. Male Goosanders migrate to moulting grounds in north Norway, while male Red-breasted Mergansers move to estuarine and marine habitats around Britain.