EEL POPULATIONS IN RIVERS IN THE 'SOMERSET' CATCHMENT

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SUMMARY

Concern is expressed over the well-documented drop in numbers of elvers returning to Northern Europe over the last five years and the possible implications of the loss of an important carnivore. The results of surveys of Somerset rivers are given, with information on eel biomass and density, providing base-line data from which future trends within the county can be evaluated.

KEYWORDS

Eel numbers, eel biomass, Somerset

INTRODUCTION

There has been a well documented drop in the number of elvers arriving in European rivers since the early 1980s. Understandably this has raised concerns about both the likely causes of such a decline and the long term impact on populations of eels in the freshwater reaches of rivers. These concerns were the subject of a major Research and Development project initiated by the National Rivers Authority (White & Knights 1994). The project report draws attention to a strong correlation between the decline in elver numbers with a recent northerly shift in the north wall of the Gulf Stream. The impact of a decline in elver numbers on eel populations in freshwater depends on a number of other key factors including the available habitat for eels, obstructions to migration, rates of mortality and predation and the amount of commercial exploitation at different life stages. If eel numbers were to decline significantly in freshwater habitats there could be far reaching consequences simply because eels can inhabit most freshwater habitats and can tolerate a wide range of water quality. They are important carnivores and an important prey of several protected species including various birds and the otter. Eels and elvers have a large commercial value as a human food item and, because European eels have not been successfully reared from artificially spawned stock, the elver stage commands a high commercial value as the starting point for eel farming and restocking.

EEL NUMBERS IN SOMERSET RIVERS: FISHERY SURVEYS

Fish populations have been routinely surveyed by the Environment Agency and its predecessors. Such surveys can provide some information on eel numbers within river systems and hopefully in the longer term may indicate trends in eel populations. The

"Somerset" catchment comprises all those rivers which drain to the sea along the coastline of the historic county of Somerset and excluding the River Avon. Prior to the beginning of 1991 eel numbers were not recorded during fishery surveys as the efficiency of eel capture was believed to be poor by both electric fishing and netting. Since 1991 the use of more modern electric fishing gear has resulted in a perceived improvement in eel capture by this method. This report has been produced to show the results of five years of fisheries survey work from 1991 to 1995 which enables a tentative picture of quantitative eel data to be produced for many Somerset rivers at sites where electric fishing is possible. Future survey work will allow a comparison between eel numbers on a site-by-site basis and should reveal general trends in the population, particularly if a common trend is evident at all sites within a particular river or tributary. The data set is inevitably incomplete as the lower reaches of many rivers and all the large drains have too large a cross section to be electric fished effectively. There are also many smaller watercourses which are potential eel habitat but which have not been investigated.

The biomass data shown in Fig. 1 are derived from the actual number of eels caught at each site and are therefore minimum estimates. The centre of each spot is at the National Grid Reference of the site but the size of the spot has been chosen to allow an overlap in many instances. This method of data display helps to give a general impression of eel abundance in a river system and reduces the temptation to compare individual sites which could be misleading given the variability arising from local differences in habitat, capture efficiency and date of survey. The map has been produced using Dmap, a plotting programme developed by Dr Alan Morton.

The eel biomass density class boundaries are taken from eel class status as defined in the National Rivers Authority Fisheries Classification System (Mainstone, Barnard & Wyatt 1994). The base data set used to derive the Classification System was collected from a wide range of rivers in England and Wales and the five classes of eel biomass were constructed so that each contained 20% of the base data set of sites where eels occurred. The number of sites in the "Somerset" catchment falling into each class is shown in Table 1.

TABLE 1

CLASS	NUMBER OF SITES
[no eels]	[29]
< 70 gms per 100 square metres	23
< 141 gms per 100 square metres	15
< 285 gms per 100 square metres	36
< 572 gms per 100 square metres	49
> 572 gms per 100 square metres	56

On this basis it can be seen that nearly 60% of the Somerset sites where eels occurred lie in the top two classes against an expected 40%. Even if the eel populations have been underestimated locally these sites appear to have eel populations above the national average.

Eel density has been examined as well as biomass density and in almost all cases sites with a high density of eels are those with a high biomass density. One river, the Horner Water, in West Somerset has a lower biomass density than its eel density would produce elsewhere in the study area. The explanation may lie in the type of habitat which this steep-gradient river offers. Small eels are able to hide in large numbers under the boulders and rocks but there are few niches for larger individuals. It is also possible that eels here are small for their age as foraging is likely to be difficult in this very high velocity regime.

Examination of the data presented in Fig. 1 shows that some rivers appear to have better eel populations than others as, for example, the River Yeo (Congresbury), River Axe, River

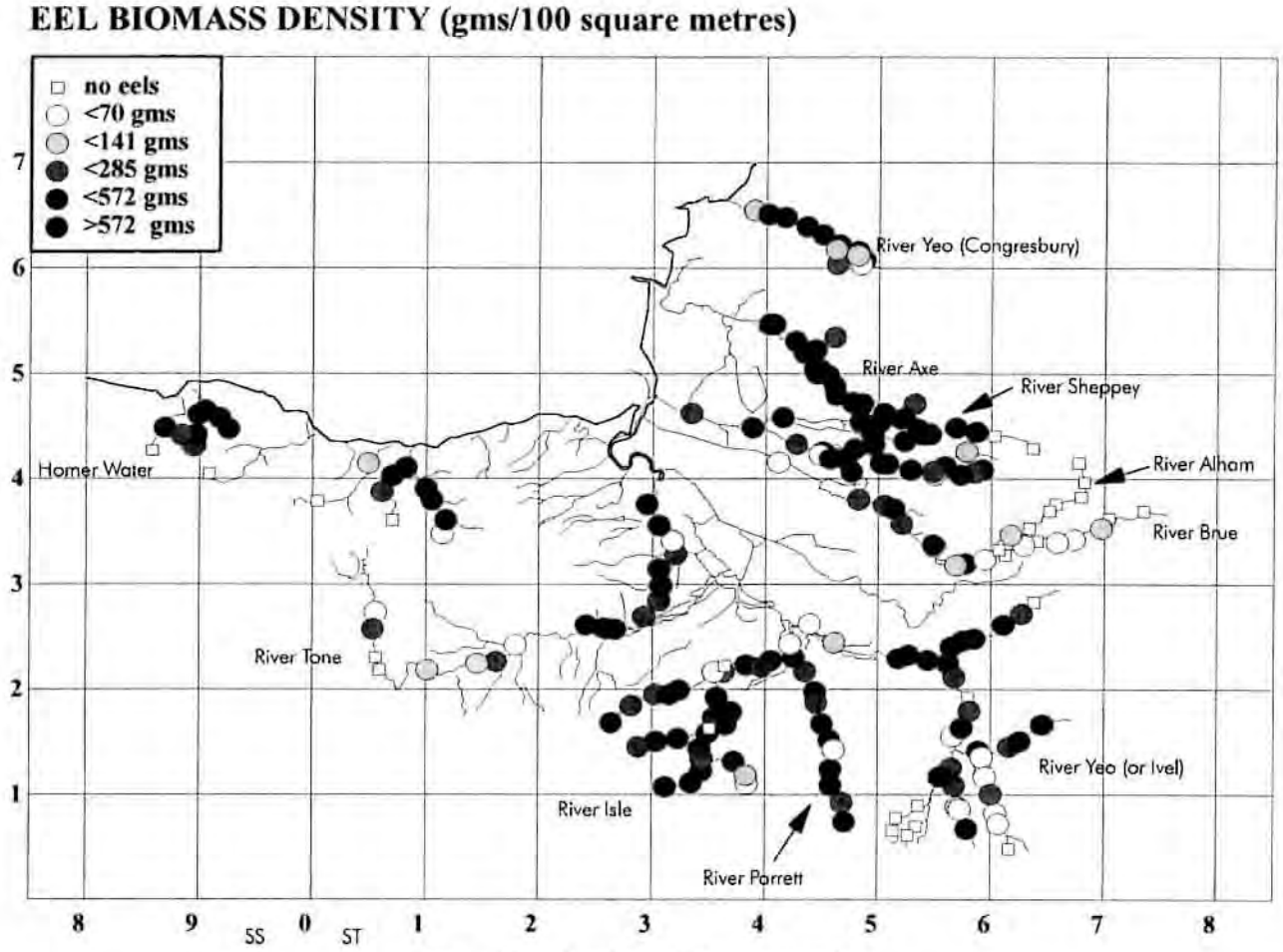

Fig 1. Map showing eel biomass density.

Sheppey and River Isle. There is no obvious common factor linking these four rivers and there are some obvious marked differences. For example, the commercial exploitation of elvers is concentrated on the tidal River Parrett yet eel population in the upper River Parrett and its tributary the River Isle is high in contrast with the eel population of the River Brue where elver exploitation is much lower. This suggests that physical obstruction to migration and the availability of habitat are at least as important as recruitment in determining the resident eel population. Emphasising this point at the extreme is the impact of high obstructions: no eels were found above the dams of Sutton Bingham Reservoir in the River Yeo (or Ivel) catchment or Nutscale Reservoir in the Horner Water catchment. A noticeable drop in eel population is also evident in the upper River Brue upstream of high weirs at Lydford and Lovington. The River Alham, the major tributary of the upper reaches of the River Brue, only had eels at one out of eight sites. This is possibly attributable to another high weir which lies at the confluence of the Alham and Brue. The data presented here appear to confirm that in-river structures can seriously impede eel movement. This is contrary to the popularly held belief that elvers and small eels can 'climb' anything. Those waters which contain few or no eels should be a priority for attention and there is clearly a need to identify structures which can pose a problem and to consider the construction of suitable passes. In some catchments stocking the headwaters may also be temporarily beneficial. Such stocking may also encourage natural recolonisation as there is evidence that elvers are attracted to waters containing other elvers or juvenile eels (Pesaro *et al.* 1981).

Note. In this paper the term elver is used to cover both the transparent glass eel and the later pigmented elver stage of the juvenile eel. Since this paper was written, a further survey (1997) of the River Isle has revealed a marked drop in the eel population compared with that found in 1992 when the data for the river were obtained for this paper. This helps to illustrate the importance of regular monitoring in revealing changes in populations with time. Repeat monitoring will reveal if similar trends appear in other rivers.

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Francis Farr-Cox was born and educated in Somerset and graduated with an Honours degree in Zoology from the University of Bristol. He started his working career with the Somerset River Authority and has worked for its successor organisations: Wessex Water Authority, the National Rivers Authority and now the Environment Agency.