

A survey of the fish and crayfish populations at the site of a disused water meadow on the River Frome, Dorset

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EXECUTIVE SUMMARY

1. The fish populations of all the channels currently present on a disused water meadow were surveyed on 29 September 1995.
2. The observed fish fauna was typical of chalk streams.
3. No crayfish were observed.
4. Over the whole site the brown trout *Salmo trutta* population showed a healthy age structure, but this was only because most of the juvenile trout were found in the one remaining working drain. This emphasises the importance of this drain, and a high value should be put on its maintenance.
5. It is hypothesised that restoration of the remaining drains will significantly increase local trout production.
6. It is recommended that an annual monitoring of all channels in the meadow is completed to detect and record the effects of the restoration of the water meadows.

INTRODUCTION

Dorset County Council are beginning work on the restoration of a disused water meadow above Maiden Newton on the River Frome, in partnership with the land owner. One of the objectives of this operation is to monitor the effects of the restoration on local wildlife. In order to assess these effects it is necessary to make some estimate of the current status of the wildlife prior to the restoration.

The objective of this report is to provide information on the fish populations in the main river, two side channels and two drains currently running through the site before they become part of an operational water meadow.

Site Description

The site comprises approximately 4.2 acres of derelict water meadow. A map is shown at Fig 1 detailing the various channels and drains and showing the positioning of the sampling sites.

The main river runs along the east boundary, and then splits at the southern end into two channels the smallest of which travels along the southern edge of the meadows. It is this side channel which receives the water from the two existing drains, and when the meadow is fully operational from all the working drains. A further small channel runs along the western edge of the site, which then connects with the side channel running along the south.

Most of the old drains are silted up and over grown with grasses. Two of the drains (site 4 & 5) contained water. The drain at Site 4, was heavily silted, blocked with weed and stagnant. Site 5 differed in that there was a good flow of water through it and the substrate consisted of clean gravel.

METHODS

Five sites were selected and their fish populations surveyed on 29 September 1995. The positions of these sites are detailed in Fig 1. One site was chosen on each of the currently existing channels. These comprised the main river channel, two side channels and two drains.

Each site was blocked at both ends with nets and electric fished with a single anode (Honda 1 KVa generator) in the case of the main river and the two side channels, and with a single anode (IFE/Deka battery) in the case of the two drains. Apart from Site 2, which was fished three times all sites were fished twice. Numbers of fish in each site were estimated using the "multiple catch depletion" method (Seber, 1982).

All brown trout captured were measured to the nearest mm (fork length), and a sample had scales removed for age analysis. The presence of all other fish species was noted. During the survey observations were made for the presence of crayfish.

RESULTS

A list of the fish species captured is given in Table 1. This list is typical of the upper reaches of chalk streams. Salmon *Salmo salar* parr were absent indicating that the adults rarely migrate above Maiden Newton. Many of the coarse fish, notably dace *Leuciscus leuciscus* and pike *Esox lucius*, known to inhabit the R. Frome were absent. It is possible that these may be infrequent visitors this high up the river.

Table 1.List of fish species found on the site of a disused water meadow on the R. Frome at Maiden Newton.

Species	Latin Name	Sites present in
Brown Trout	<i>Salmo trutta</i>	1, 2, 3, 5
Eel	<i>Anguilla anguilla</i>	1, 2, 3
Bullhead	<i>Cottus gobio</i>	1, 2, 3, 4, 5
Minnow	<i>Phoxinus phoxinus</i>	1, 2, 3, 4, 5
3 spined Stickleback	<i>Gasterosteus aculeatus</i>	4, 5
Stone Loach	<i>Barbatula barbatula</i>	1, 4, 5
Brook Lamprey	<i>Lampetra planeri</i>	1, 2, 3, 4, 5

The vital statistics of each of the five sites, together with the densities of trout found in each site are given in Table 2.

Table 2.The length, area and density of 0+ and older trout found in each of five sites of a disused water meadow on the R. Frome at Maiden Newton.

Site no.	Length (m)	Area (m ²)	Density of 0 year old trout (n/m ²)	Density of 1 year old and older trout (n/m ²)
1	63	340.2	0.062	0.115
2	47	98.7	0.081	0.142
3	51	117.3	0.034	0.145
4	109	51.3	0	0
5	57	119.9	0.269	0.017

A length frequency histogram for the trout caught on all five sites is at Fig 2. The population showed a healthy age structure, with the greater numbers of fish being in the youngest age group.

Densities of 0 year old fish and older fish in each of the five sites are shown at Figs 3 & 4 respectively. The vast majority and the greatest density of 0 year old fish were found in the one working drain at Site 5. The stagnant drain (Site 4) contained none, and there were approximately equal densities found in the main river and two side channel sites.

Few trout older than 0 years old were found in the drains and these fish were largely confined to the main river and two side channels.

No crayfish were observed.

DISCUSSION

Provided that spawning is not a limiting factor population regulation in brown trout in both chalk streams (Solomon & Paterson, 1980) and upland streams (Elliott, 1985) is regulated by density dependent factors in the first few months after hatching. Once this period has passed population regulation becomes density independent. This means that the area available for juvenile fish will determine the strength of any particular year class. Thus if there is little habitat available for these fish, low numbers of them will survive and this will be reflected in future years in the numbers reaching adult stages. Conversely, where there are large areas for juveniles, survival is high and a larger number reach the older groups.

This survey emphasises the role of the drains in providing habitat for juvenile trout. The working drain contained most of the juvenile trout of the whole water meadow. Without the drain the numbers of these fish would have been very low and the fish population would not have had such a healthy age structure. Since this is the most important stage in maintaining and increasing fish densities of older stages in the main river, a very high value needs to be placed on this drain. The lack of trout in the stagnant drain demonstrates the need to maintain drains in a good condition if they are to be useful as habitat for juvenile trout.

It is suggested that restoration of some or all the other drains is likely to have a dramatic effect on local trout production. Indeed the impact may extend for a good distance downstream, and should be of great interest to any anglers in those parts.

There is some anecdotal evidence that after a period of inundation, fish may become stranded on the meadow when the water runs off. If mortality resulting at this stage is serious it may be necessary to perform a fish rescue as a matter of routine during such events. Much of the worry, with this type of event concerns downstream migrating salmon smolts which migrate onto the meadow and then cannot find an easy passage out. This is of no concern at this site since there are no salmon present.

RECOMMENDATIONS

Clearly, the restoration of the water meadow and its associated structures and channels could potentially have a dramatic effect on local fish populations, in particular, trout. Any changes could occur quite rapidly and these sites should be monitored on an annual basis to detect and record the effects. In addition, any further channels, in particular drains, created or restored should also be monitored. Costs for this work should not exceed the costs of the current study.

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