

Specification for the improvement of fish habitat on the River Skerne at South Park

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SPECIFICATION FOR THE IMPROVEMENT OF FISH HABITAT ON THE RIVER SKERNE AT SOUTH PARK

Summary

1. The River Skerne at South Park supports no fish with any fishery value.
2. The channel is approximately straight and rectangular in profile. The habitat is of poor quality for the target species, dace and chub.
3. The river passes through amenity land currently in use as a pitch and putt course.
4. It is recommended that habitat improvements are contained within the existing channel and that gross channel alterations are avoided. This is for the following reasons:-

(a) There are already extensive channel improvements occurring upstream of this site, including the installation of meanders and side channels creating a wide variety of habitats. The incorporation of such comprehensive habitat diversity in South Park will not add significantly to the productivity of fish in the river Skerne as a whole. Therefore improvements should concentrate on the provision of habitat suitable for adult dace and chub.

(b) The use of the surrounding land as a pitch and putt amenity, would be threatened by gross channel alterations.

Introduction

The River Skerne drains an area of mixed urban and agricultural land, before entering the River Tees. In 1990 the water quality above Darlington was classified at Grade E poor, but below Darlington this improved to grade D fair.

Past fish surveys indicate the existence of two independent fish communities. At the lower end of the river, between South Park and the confluence with the Tees there is a mixed coarse fishery, dominated by dace and chub, but also including grayling, roach, pike and trout. Above South Park the fish community is dominated by the presence of stickleback, and there is no substantial natural population of any species with a fisheries interest. The division of these two communities is at the South Park gauging weir which is impassable to upstream migrating fish.

During 1992 and 1993 numbers of dace and trout were stocked into the River Skerne above Darlington. Recently, during fishery surveys some of the trout have been recovered, and have been shown to be growing well. None of the stocked dace were recaptured, and to date there has been no evidence of any successful spawning resulting from the trout stocking, although significant egg production from these fish would not be expected until the winter of 1994.

Much of the channel of the River Skerne has been modified for flood control purposes. However, above Darlington a considerable section of the river is undergoing various habitat improvements, with the general purpose of increasing habitat diversity. This has included the incorporation of a meandering channel with some floodplain structures such as backwaters.

The National Rivers Authority is considering the installation of a fish pass at the South Park gauging weir, and this would allow the colonisation of the river upstream of this point by the fish community found downstream. If the fish pass is not installed restocking of the river above the weir will be continued. In order to attract and maintain these populations above the weir, the physical habitat will need to be improved, and this report concerns a small part of the overall improvements i.e. those at South Park.

Site description

The South Park site consists of 400 m of river immediately above the South Park gauging weir. It passes through a park, with mown grass used as a miniature golf course. The channel has been modified by man and is almost straight, with a rectangular profile. The presence of the weir has reduced the gradient of the river and impounded it. The substrate consists of rubble, together with silt where this has deposited out of suspension. The banks are cropped to the edge of the channel.

Current factors limiting the fish population

The current factors limiting the fish populations are not associated with the physical habitat of the river in South Park. These are periodic pollution events or constant poor water quality conditions which have caused extinction of fish populations, combined with the impassable barrier at South Park gauging weir which removes the possibility for recolonisation from the River Tees. However, the water quality above may now be sufficiently good to support populations of the fish species found below the weir, and the installation of a fish pass at this structure is being considered.

With the potential removal of these primary limiting factors, other limitations of the river above the weir need to be considered. Without a fish pass, there would need to be enough of the right quality of habitat to support self-sustaining populations of all the target species. If the fish pass is installed, provision of such a comprehensive habitat may not be as important since fish will be able to move freely into the river above the weir, although it may still be desirable.

From observations made during a one day site visit the following were identified as the potential limitations or deficiencies of the river channel in South Park:

1. The channel is wide resulting in shallow stagnant water during low flows, which will lead to excessively high temperatures and lowering of oxygen levels during the summer. There were indications that natural channel narrowing processes were taking place with sedimentation being evident close to the banks.
2. The channel was entirely lacking any form of instream structure, vital to provide cover from predation and increased water velocity in winter.
3. There were no areas, suitable for juvenile cyprinids where flow velocities would remain low during increased winter flows.
4. There were no sources of outstream cover, vital to provide protection from predation, and a habitat requirement of some fish species e.g. chub.
5. There was a lack of clean gravel for gravel spawners.
6. The channel is unattractive and has low aesthetic appeal.

Target species

As well as addressing limitations and deficiencies, the design of any

improvement must take into account the requirements of the target species. The fish community below the weir consists of several species, but most are in low abundance and it is the more abundant cyprinids dace and chub which are selected as the primary target species.

The habitat requirements of coarse fish are generally poorly understood, but it is possible to consider the general requirements of each life stage.

1. Spawning: Both dace and chub are gravel spawners, requiring areas of good flow to aerate eggs and keep them silt free. Dace spawn during March/April (Mann, 1974) and chub in May/June (Mann, 1976) in southern English chalk streams. It is thought that dace spawn during April and chub during June, in the Tees catchment (pers. comm. W Beaumont), but this may vary between years with annual variations in temperature.

2. Juveniles: Juveniles are sensitive to severe flow conditions and the fry of most species require lentic shallow habitat at least in their early stages. Further, both chub and dace show some association with plant material at some stage in their first year (Copp, 1992).

Much less is known of the winter habitat of these juveniles but it is thought that they retreat into slow flowing areas or side channels at this time of year.

3. Adults: Dace prefer to utilise water with a good flow, lying over a gravel substrate. Chub utilise a similar habitat, but the adults have a particular affinity for overhead cover.

The most appropriate options for the improvement of fish habitat on the River Skerne at South Park

The South Park section of the River Skerne is only 400 m in length, and it would not be possible to create the variety and extent of habitats required to maintain a sustainable population of dace and chub in its own right. Thus the habitat improvements to this section have to be considered in the light of the current habitat of the whole catchment. For example, there would be no point in concentrating on the provision of spawning habitat, if these areas are already abundant upstream.

Further the failure of fishery surveys to recapture any of the stocked dace above the weir, although put down to the small numbers stocked, may be because these fish no longer remain above the weir. The adults of this species are known to make significant upstream and downstream migrations. If on one occasion they migrate below the weir it is not possible for them to return. Thus even the provision of adequate habitat for all life stages may not be sufficient to maintain a self-sustaining population of the target species above the weir, unless the fish pass is installed.

There are already considerable habitat improvements occurring upstream of this site, and these include the installation of meanders, and side channels mimicking a more natural regime. It is expected that the resultant wide

variety of habitats over quite an extensive length of river will provide all of the requirements of the target species. The 400 m section at South Park is a very small part of the River Skerne. Even if it were possible to incorporate enough habitat variety to sustain every life stage of the target species within this small area, any increases in fish production resulting from the habitat improvements to this section, will be insignificant when considering the River Skerne as a whole.

Thus, the priorities for this channel would be better set for increasing its aesthetic qualities, and providing habitat suitable for the adults of the target fish species. This is particularly the case since the adjacent land is open to the public and is currently used as an amenity i.e. pitch and putt.

This type of improvement can be contained within the existing channel, thus negating the need for any gross channel alterations, and easing negotiation with adjacent land owners. Overall this reduces the financial costs, and the short term disturbance to local users.

Therefore a number of improvements within the existing channel have been recommended, rather than altering the passage of the river which would reduce the gradient further.

Description of the recommended improvements

Potential habitat improvements are shown in Figure 1. The examples given are not intended to be exclusive, but they do show the type of structures that could be incorporated into the channel. Generally they are associated with narrowing the channel, raising and deepening the river bed to provide riffle and pool features, creating wetland habitats for aesthetic value and cyprinid fry habitat and creating cover.

The simplest and easiest improvement to the aesthetic quality and lack of cover, would be to plant shrubs and trees on part of the banks. However, it is recommended that adaptations of at least some of the improvements shown in Figure 1 are incorporated into the channel.

Referring to the examples in Figure 1:

- a) The channel can be narrowed by installing a gravel shoal, to such a height that it creates an island, during low flows. To stabilise the shoal some of the rubble substrate can be used. This should increase flow either side of the island, creating a habitat more suitable to adult dace. The island may act as a barrier to free passage of flood flows, and its dimensions will need to take account of maximum flows. During excessive flows the shoal may move.
- b) The topography of the river bed can be altered, by raising and lowering it

at intervals. Spoil from the deepened areas can be used to create the raised sections. Riffle sections will need to be raised above the level of the weir. Thus this particular option may be best suited to the upper reaches of the section, where the current level of the river bed is highest. The raised areas can also be associated with the creation of islands. The provision of faster flowing riffles should help maintain oxygen levels, and the deeper pool areas will provide a temperature buffer. Both these types of habitat are suitable for dace and chub adults, and the riffles will provide potential spawning sites.

c) The channel can be narrowed by installing staggered deflectors. The area behind each deflector will fill naturally with sediment, and protection from flow will allow the growth of emergent vegetation. The narrowing of the channel in this way will help speed up the flow of water, causing scouring in the centre of the channel. Growths of vegetation behind the deflectors will improve the aesthetic qualities of the river. The variable velocities that occur around these structures, provide habitat for different size classes of juvenile cyprinids. Narrowing of the channel can reduce its capacity to carry flood water, and the angle and size of any deflectors will need to take account of maximum flows. Deflection of the water across the channel can have impacts for erosion on the opposite bank, but the staggering of deflectors can halt this process. Additional stability can be obtained from planting shrubs at intervals along the banks. These provide overhead cover for chub, and are preferred to wooden boards used as covers, because of their more aesthetic qualities.

d) Small bays cut into the side of the channel, provide excellent habitat for juvenile cyprinids, and are often colonised by emergent plants. These can become silted quickly unless natural flow is utilised to clean them. Bays should be associated with a structure which directs some of the flow into the bay.

e) This is similar to a) above. The substrate can be set at differential heights either side of the island, to force the bulk of the flow down one side, creating a deeper faster flowing region suitable for dace and chub. Low shrubs can be planted over this section to provide overhead cover for the chub.

f) This is similar to d) above, except that a deflector has been used to direct the current into the bay.

g) The channel is actually narrowed with backfill, taken from the centre of the river, thus narrowing and deepening the channel. This may be a suitable option for the river channel close to the weir. The deeper holes will act as cover for cyprinid adults. This should have little effect on the passage of flood flows.

References

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Figure 1. Map of the River Skerne at South Park, showing potential habitat improvements.

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