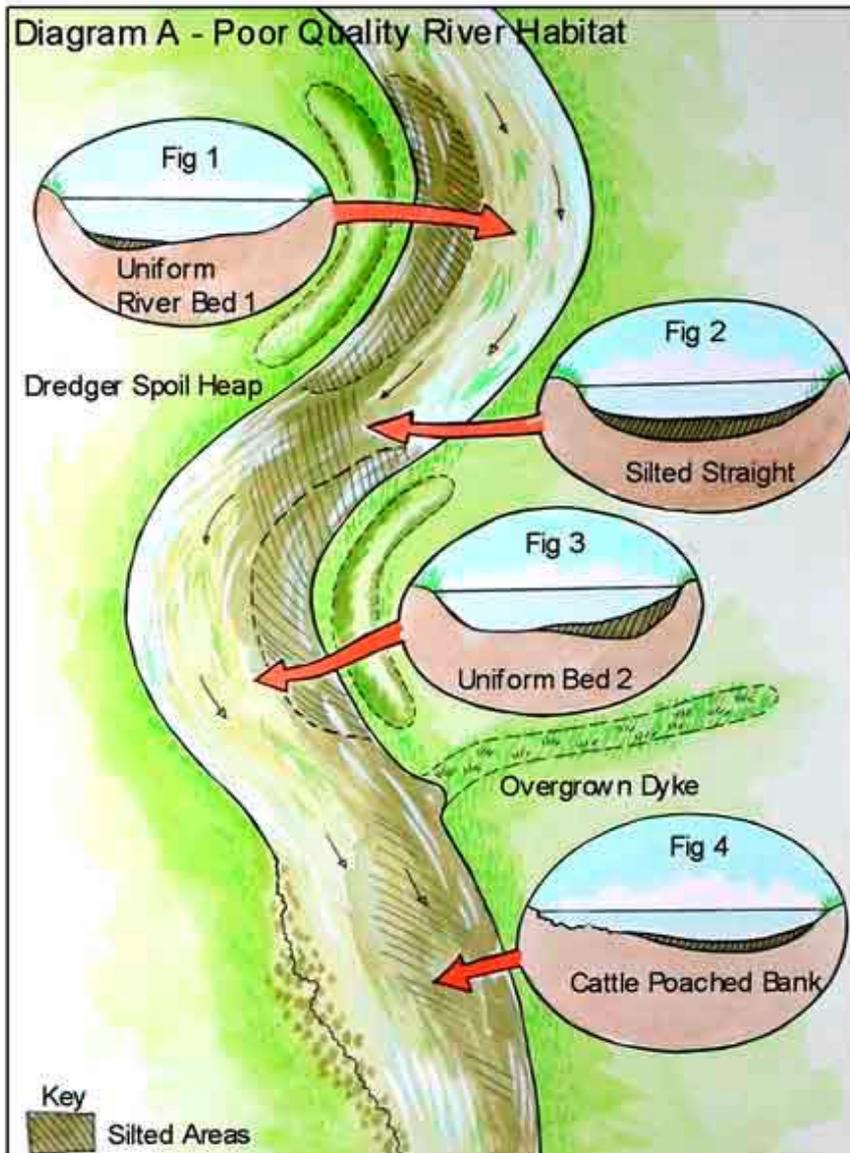


'The Costessey Point Project'

Beginners Guide to River Restoration

In this article with my text, and Chris Turnbull's artwork we will endeavour to give you a brief understanding of what is poor river habitat and highlight some of the many restoration options available. Lastly we will outline how you, your syndicate or club could potentially initiate your own project, which is not as daunting a task as it first may seem.

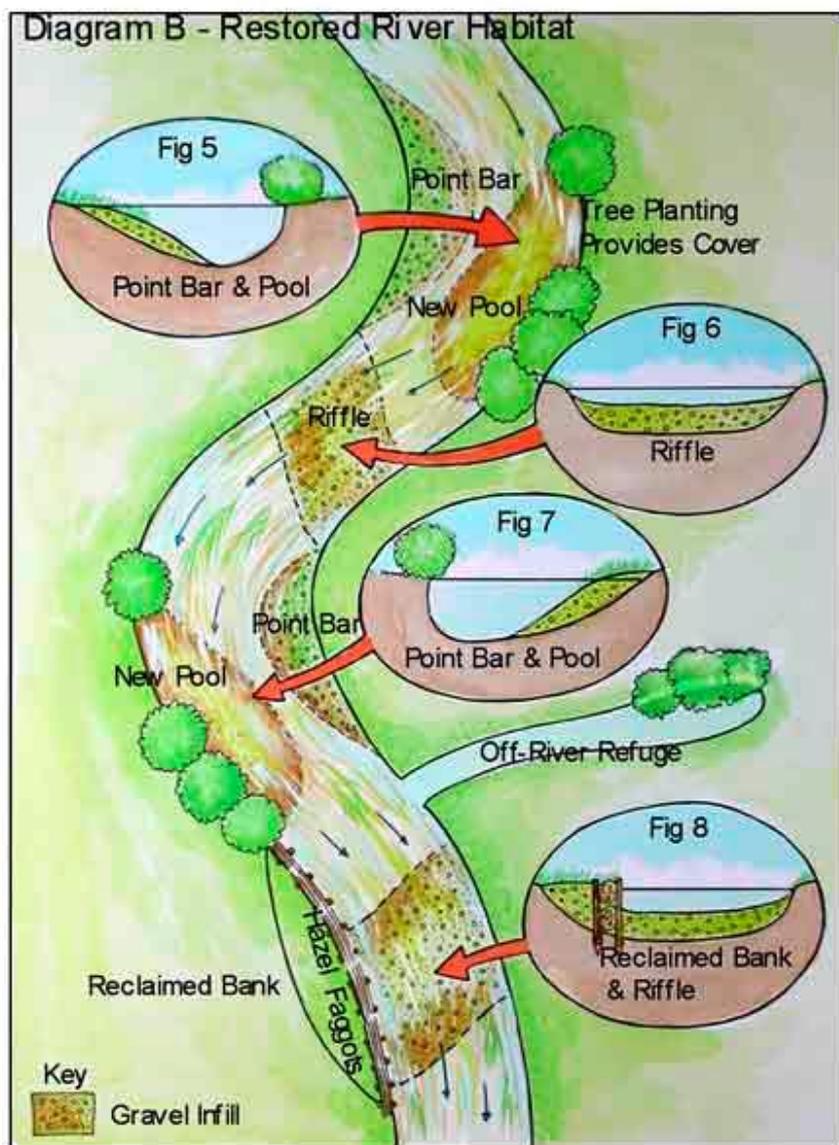


You will see that there are two diagrams in this article. Diagram A. shows a typically degraded section of habitat and Diagram B shows some approaches available to reverse the situation. Diagram A. illustrates many of the problems with river habitat that have been caused by land drainage management operations that took place several decades ago, when conservation issues did not have the valued placed on them as they do today. This diagram shows a typically dredged stretch of river channel. We can see that the bends in figs 1&3 have been dredged from the inside creating bends of uniform depth, which also act as silt traps. Natural bends are deeper on the outside and shallower on the inside, this is what is termed as an asymmetrical profile. The deeper area provides superb habitat for adult fish and as we all know act as great places to catch species such as chub and barbel. Often the material from the dredging operations is left as a spoil heap on the riverbank. Next time you're on the river keep a lookout for these banks, they are more common than you'd think. Rectifying this situation can be tackled by placing the dredged

material, or fresh material back into the inside of the bend as shown in Diagram B. The silt that has accumulated on the outside of the bend can be dug out to restore the natural profile of the bend. These features are called 'point bars' and perform several functions. They channel flows around the now deeper outside of the bend keeping them silt free. Vegetation will also colonise the point bars, acting both as natural silt traps, and also providing useful spawning areas for species such as roach and perch.

You will also see in figs 5&7 that trees have also been planted on the outside of these bends. Riverbank trees provide several key functions in a river environment. They provide over-head cover (shade) and a valuable source of invertebrates (food) for many species of fish, mammals and birds. Tree roots also stabilise the banks and reduce the erosive capabilities of winter flood flows. Think

about your favourite chub and barbel swims and I'll bet a high number of them are deeper water areas with trees and bushes present.



Moving down the channel from the first bend in diagram A we come to a straight section where naturally occurring shallow gravel areas have been removed. These gravel shallows are called riffles. Historically riffles have been dredged from rivers to increase the capacity of the river to quickly transport flood flows out to sea. Riffles, being shallower areas, were thought to be obstructions to flood flows. This is now known not to be true as recent research tells us that at times of flooding riffles tend to 'drown out' therefore do not impede flows or cause flooding. Riffles are naturally occurring features, which help elevate flows and generally occur on lowland rivers about every seven widths of the channel. On a natural river you might expect to find riffles on straight sections and at the entrance and exits to bends. For many species of fish riffles are essential for spawning and feeding needs. Chub, barbel, dace, grayling and brown trout all require good clean and well oxygenated gravel for eggs to survive from larval development and emergence into the river as fry.

Options for the restoration of dredged riffles as shown in diagram B fig 6 are often a choice between repatriation of the original dredged material or otherwise importation of fresh gravel from a local quarry. From an ethical point of view repatriation would, at first, seem the best thing to do. This may not always be a practical option, as very specialised equipment is needed to remove soil and debris from the gravel prior to placing it back in the channel. The vast majority of riffle projects have therefore used imported material from gravel pits. This trend is slowly changing, and a project I am designing at the moment will 'recycle' gravel back into the river where it should be. As long as the fresh material matches the sizes required for the fish spawning requirements there should not be a problem. Make no mistake riffles are fish magnets for the reasons stated above. On the Norfolk Anglers Conservation Association stretch of the Wensum the restored riffles are now beginning to pay dividends with small juvenile barbel being observed on the fishery for the first time.

Moving again downstream, on the right bank of diagram A. there is an overgrown dyke that was once connected to the main river. In their original wet and connected form these areas would have acted as important refuge areas for coarse fish. In the summer months they act as summer refuges for fry to develop in warmer water away from the main flow to help them get through their crucial first winter. On the Wensum this is especially important as the river receives all of its flow from the chalk aquifer. Chalk stream water temperatures are relatively low in the summer and shallow warmer water areas have been shown to be very important for fry development and survival.

A quick inspection of the shallow water in cattle drinks on the Wensum in summer demonstrates this brilliantly, as they are normally heaving with fry. During the winter months connected dykes and backwaters can provide added benefit of acting as flood flow refuges, stopping the young of the year from being washed out of the river system.

Overgrown dykes can be cleaned out and reconnected back to the river to their original dimensions, or still further enhanced by creating shallow bays at the end which can be planted with bushes to provide shade and refuge from fish eating predators. Many rivers in East Anglia have been straightened over the last century, as with riffle removal, in a bid to transport floodwaters more quickly. Often these old meanders can easily be identified visually or from old maps. It is not always possible to restore them to their original form and function as river bends. However they can be brilliant sites for connection back to the river to act as backwaters. Agreed, not as nature had originally intended, but it's a good second best.

Moving to the end of the stretch we come to a section that is suffering the effects of heaving trampling by cattle. Cattle need water and most of the time will obtain this resource by drinking directly from the river itself. If formalised cattle drinks are present there are no impacts on the fishery, however if large numbers of cattle have free access then serious problems may occur. As cattle make their way down to the river to drink their heavy feet tend to trample the banks and push loose soil into the river, this is known as a poached bank. On a minor scale this does not represent a problem and can actually increase plant diversity. However if the poaching is heavy, banks will become unstable and crumble into the river to wash away as silt, which as we know is detrimental to gravel spawning areas. As more and more of the bank is washed into the river the channel becomes much wider and shallower, and not at all suitable for fish.

In this situation intervention involving one or several techniques is required to halt the decline. First of all it is vital that access to the river by the cattle is managed, using fencing, to encourage them to obtain water at properly constructed cattle drinks. Apart from keeping the cattle from poaching the banks the fence performs the dual function of allowing bankside vegetation to develop which in turn provides cover and food for fish, birds and mammals, such as water voles. At this stage we may still be faced with a over-wide stretch of river which needs to be restored back to it's 'post poaching' dimensions.

A commonly employed technique is to re-narrow the river using hazel bundles known as faggots. The 'faggots' are staked in a line to where the old banks would have been. Once secured, material is placed behind the faggots to form a solid backfill. Material for this can be silt from the channel, old dredgings or imported material, or a combination of all three. To finish the narrowing pre-planted coir mats can be placed on the fresh backfill that contain rooted wetland river plants. The root structure of these plants will very quickly stabilise the recently narrowed section. I would advise not to seed back-filled areas, as newly sprouting vegetation tends to be attractive to wildfowl. If this situation arises back-filled areas may not stabilise before the arrival of winter flood flows, which could potentially erode the back-filled material.

In diagram B we can also see a riffle has also been placed back into the river, which may at first seem a little odd. However if we think to why the cattle were drinking here in the first place it is often the case that originally it was a shallow gravel area which was easy to walk on. It is probable that natural riffles were indeed at these locations.

This combination of techniques have all been successfully employed on the Wensum and many other lowland rivers.

At first you may think that this all sounds like a hell of a lot of work and investment to make. Perhaps stocking could be an easier and more 'cost effective' approach to managing the fishery.

This is a fair comment, but let's think about it in some more detail.

If your river fishery not producing the quality of fishing you would like, stocking indeed may be a justified technique. However before reaching this decision you need to ask the question – “**what is limiting the potential of the fishery?**”. It could be water quality or quantity, however, it is often the case that a component of the habitat required by certain or all of fish species present is missing, perhaps having been removed in the past. It may be that spawning areas are degraded, or there is poor nursery habitat, cover for adults or combination of all three, and more besides. If indeed this is the case, stocking fish into a stretch with habitat that does not fulfil the life-cycle requirement of fish species present, is an unsustainable option.. An analogy for this situation may be akin to standing at the top of the fishery chucking £10 notes downstream never to be seen again. Stocking fish into poor habitat can simply mask the real ills of the fishery in the short to medium term. If the aim of the club, etc, is to have a healthy sustainable fishery then the habitat must be managed accordingly. This is not concept exclusive to fisheries management. Ask any successful Game Keeper and he will tell you that one of the major factors to running a successful shoot is to get the habitat right for cover, feeding roosting, nesting, etc. to hold the birds from wandering away to the neighbouring estate. I am certainly not ruling out stocking as a viable fisheries management technique, but for it to be successful the habitat, (assuming no other limiting factors) must first be right for the fish.

By now you may be interested in looking a potential projects on your own river fisheries, but how do you go about it? This really represents a whole article itself.

You can use the services of a consultancy like mine, who would be able to do a habitat assessment and advisory report for a modest charge. Another good place to start is the Wild Trout trust who have produced a guide which I co-authored titled 'Improving Trout Streams' They can be contacted at www.wildtrout.org. This guide is as useful for coarse fisheries as game.

However your first point of contact should be with your local Environment Agency Fisheries Team. EA Fisheries staff will be able to provide you with a wealth of useful information, data, ideas and contacts to help you start to scope your project ideas. The Agency may potentially be able to enter into partnership on certain schemes providing technical and even financial assistance. However to get your project off to the strongest possible start please contact The EA at the very beginning. Even if it is just initially to talk through some ideas, you never know where it might lead, and it may save you making some very time consuming and financially expensive mistakes. Landowners are the other essential element to get on board, again right from the very start. Get the landowners and the Agency on board from the start and you may be on to a real winner,

For those of you that **still** remain sceptical I suggest you contact Chris Turnbull at chris@thefishturnbull.fsnet.co.uk. I'm sure he would be only too pleased to tell you how successful NACA's project has been.

Words by Simon Johnson

Artwork by Chris Turnbull