



## **e) River & pond restoration/creation at Holkham**

At Holkham we are very lucky to have three wetland habitats in saltmarsh, rivers, and ponds and lakes. Each of these habitats contains its own unique flora and fauna. During the winter, thousands of wildfowl visit the saltmarsh and they become important breeding grounds during the spring and summer. Like all habitats, they benefit from management. We have created a number of new ponds and enhanced existing ones.

In 2002, the Estate embarked on a demonstration project to restore river habitat on the River Stiffkey at Wighton.

Lord Coke, Nick Zoll and Charles Rangeley-Wilson were discussing the sad demise of the streams running not only through the Estate, but across Norfolk; and decided to take steps to improve the fortunes of these precious wildlife assets. Charles Rangeley-Wilson, as Chairman of the Wild Trout Trust, commissioned Fisheries Consultant Vaughan Lewis to design three demonstration projects on the rivers Stiffkey and Burn. The ideas were submitted to the Environment Agency for approval. This process took over a year to complete before finally getting approval 'in principle' for just one scheme at Wighton.

The Estate then employed Simon Johnson of Reef Consultancy Services Ltd to manage the project to improve habitat for the wild brown trout and enhance biodiversity in the river valley.

Before the scheme could go ahead the site had to be surveyed for water voles, whose habitat is protected under the Wildlife and Countryside Act (1981). Steve Henson from The Anglian Otters and Rivers Project conducted the survey and made several recommendations to ensure that the many voles he found were not harmed during the works.

The project involved the creation of three gravel shallows, called 'riffles'. Riffles are important to trout, which need clean, well-oxygenated gravel to successfully spawn and lay their eggs in. The Stiffkey, along with many other streams in East Anglia, has had many of its riffles removed in a bid to improve land drainage. Post the Second World War, many thought that riffles held up flood flows, causing rivers to burst their banks. 'Efficient' land drainage operations saw the demise of many trout streams. Rivers were dredged to make them wider and deeper, to accommodate flood flows and protect agricultural productivity. However, studies have shown that to widen and deepen a channel, causes flow velocity to slow and silt deposits to occur in the channel. This creates a need for further 'unsustainable' dredging in a bid to maintain an artificial channel. In a natural channel with gravel shallows and pools, velocities tend to be faster, thus creating a self cleaning channel requiring much lower levels of maintenance.

Approximately 380 tonnes of gravel were 'dumpered' across the meadows to the three riffle sites, by Paul Lingwood of Hector's Housing Ltd. Each riffle was created using a central core of whole stone rejects, overlaid with a 35cm layer of 5-40mm gravel, which is suitable for successful trout spawning. Several large flints were placed on each riffle to allow trout 'swim-up' fry to seek refuge from the main flow, when they emerge from the gravel.

Water levels were continually monitored at Wighton Bridge throughout the scheme and no increases were observed. Ironically, after nearly two years of planning and consultation, the scheme was finally completed in just two days. Within a couple of hours of finishing, brown trout and brook lamprey were spotted on the new riffles.

It is important to note that the scheme isn't just about improving habitat for trout. The wider aim of the project is to demonstrate the positive conservation benefits that holistic river management on the Estate will bring. Many species of plants and invertebrates will flourish in their new environment, which will in turn benefit the wider ecology of the Stiffkey Valley.