River Lugg Internal Drainage Board

Annual Works for Flood Prevention and Biodiversity Enhancement

1 Introduction

This document outlines a few key examples of how the River Lugg Internal Drainage Board (RLIDB) delivers in its commitment of maintaining year-round conveyance of water flows and reducing flood risk, while seeking to retain and protect biodiversity and the natural water environment within its district, which covers over 220 km of watercourses within an area of some twelve thousand hectares.

As a competent authority, the RLIDB maintains flood prevention standards, exercising its duties under the terms of the Land Drainage Act 1991. The RLIDB also strives to uphold its nature conservation duties under the various environmental legislation[1] including the Wildlife and Countryside Act 1981, the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003, and the Conservation of Habitats and Species Regulations 2017.

The majority of the RLIDB's annual works programme comprises small-scale targeted bankside and channel management, and removal of in-stream obstructions that impede flood flows. Regular management is undertaken to prevent future deterioration of the watercourse that might otherwise require more extensive and invasive management at a later date. Typically works include removal of in-stream blockages, such as fallen trees or trees growing within the central bed of the channel, coppicing, pollarding or trimming bankside trees and damaged branches to prevent material from falling in and accumulating within the channel, spot treating large stands of bulrush and other dominant or invasive herbs that restrict water flows, and bankside flailing to reduce the encroachment of scrub and promote a tussocky and diverse bankside herb community.

Restoration works are also routinely undertaken providing benefits to the watercourse and its associated biodiversity. Measures include rotational pollarding of mature bankside trees, such as willow, to prolong their life, creation of both live and dead revetments and low-lying berms to reduce bank erosion and substrate loss during high flows, installation of fencing to reduce the impact of livestock trampling, and tree planting to provide new riparian habitat and important buffer zones along the watercourse corridor. The works are undertaken by a small team of dedicated contractors led by an experienced IDB engineer, with additional advice from the IDB's acting ecologist. All works are carried out in a diligent and thoughtful manner, to good practice guidelines, and with an awareness of, and responsibility to, the natural environment and local wildlife.

The following sections illustrate the typical approaches undertaken by the RLIDB and embedded within its annual works programme.

[1] For an expanded list of relevant legislation refer to the River Lugg IDB Policy Statement 2018

2 Trimming, Coppicing and Pleaching

Background

Tree management is necessary not only for flood prevention but for retention of bank stability, management of disease and to ensure that a wide range of habitats and microhabitats are provided along the watercourse; the latter is achieved by retention of mature specimen trees, coppicing and laying to provide areas of dense foliage and wildlife cover, and manipulation of shading to encourage macrophyte growth within the channel. In addition, bankside tree management also includes management of dead and diseased trees.

Approach

Within the RLIDB district, trimming involves selective removal of large or significantly damaged overhanging branches that are likely to fall into the watercourse, causing damage to the structural integrity of the tree and bank, and potentially leading to accumulation of debris which would impede flood flows. Smaller branches are routinely left *in-situ*, for the benefit of aquatic invertebrates and fish, while unbalanced/damaged trees are usually coppiced, and the material used in bank protection and creation of dead wood piles.

Rotational coppicing is a traditional method of managing bankside trees and is practiced along RLIDB watercourses for the benefit it provides to bank stability and riparian structural diversity. Single coppicing, or allowing the tree to form only a few larger stems, is often carried out to allow more light to fall onto the watercourse. Similarly, watercourses that have been neglected, and are lined by lines of tall, straggly trees, suffer from over-shading and accumulation of organic debris with associated blockages; in this case, pleaching is usually employed with retention of selected standard specimen trees at intervals.

Alder are one of the most common species along Herefordshire's waterways, easily able to colonise the damps soils. However, in recent years this species has suffered from increasing levels of Phytophthora disease, which can result in the tree and surrounding bank becoming unstable. The RLIDB coppices diseased trees to prevent bank instability and to encourage regeneration of new growth from the stool and root system.

3 Pollarding

Background

Regular pollarding of bankside trees helps to prolong their life and prevents weakening and splitting of hollowed trunks, and associated in-channel blockages as large sections of split trees fall into the watercourse. Pollards are important wildlife-rich habitats along watercourses, and within the RLIDB district typically comprise willow, ash and alder, with specimens of black poplar *Populus nigra* ssp. *betulifolia*[2], lining the watercourses.

Approach

The RLIDB pollards bankside trees on a rotational basis of roughly 8-12 years, or depending upon species and need. Work is carried out during the winter by chainsaw/cherry picker, with the whole crown pollarded at roughly 2-2.5 m above the ground. This avoids instability problems associated with partial pollarding. The cut material is routinely used in bank revetment works or may be used to create piles of dead wood for additional habitat.

[2] Local Biodiversity Action Plan (BAP) species and RLIDB BAP species

4 Tree and Shrub Planting

Background

Where watercourses have a sufficient riparian border, or where suitable areas of land are available for planting, such as within meander loops or conservation margins that are difficult to cultivate, tree and shrub cover can provide valuable habitat for insects, birds and mammals, including otters and bats. Planting a variety of native tree and shrub species forms a natural buffer between the cultivated land and watercourse, impeding flash runoff, associated soil loss and erosion. These areas also enhance ecological connectivity of the riparian corridor.

Approach

The RLIDB undertakes tree/shrub planting where opportunities arise. For example, approximately 300 trees and woody shrubs, including English oak, field maple, beech, rowan, hazel, spindle, dogwood and holly, were planted in 2016 along a 3 km section of the River Lodon, which the RLIDB maintains. Planting was carried out around existing clumps of bramble, leaving some open areas so as to provide a structurally diverse habitat buffer to benefit a wide variety of plant and animal species.

5 Prevention of Bank Erosion and Sediment Management

Background

During flooding, increased flows can erode the watercourse banks at specific locations resulting in undermining of tree roots, severe bank erosion (forming erosion holes) and associated silt loading of the water column. Some natural erosion is desirable to produce varied habitats, such as backwaters, bays and bankside cliffs; however, bank protection in conjunction with habitat creation is a valuable tool in watercourse management, particularly in intensive agricultural areas, and prevents excessive loss of sediment.

Approach

The RLIDB employs soft engineering techniques to create natural revetments, deflectors and berms in areas of high erosion and bank instability in order to dampen strong river currents during flood conditions. A mixture of live coppiced stems and/or cut stems is routinely used to create natural deflectors and revetments with the stems pinned in place by wooden stakes, and with the brash piled behind. The coppiced trees are allowed to regenerate while protecting the bank behind; the high regenerating capacity of willow and alder means that such features created over the winter months often comprise dense vegetation by the following summer. These features provide excellent cover for nesting birds and otters. Berms are also introduced to achieve flood conveyance during high flows, but also provide additional geomorphological variation to the watercourse and, once established, provide new bankside habitat.

6 Introduction of Riffle-Pool Sequences

Background

Pool-riffle sequences develop in natural meandering stream systems as part of an alternating hydrological flow. They benefit the watercourse by increasing oxygenation of the water and reducing the resuspension of fine sediments and silts, which tend to deposit in the slower, deeper pools between the shallow and faster moving riffles. This results in reduced turbidity and can reduce the rate of sediment loss (and associated contaminants) downstream.

Approach

In the relatively straight watercourses of field boundaries, a pool-riffle sequence can be introduced by installing shallow berms at intervals across the bed of the watercourse. This has been undertaken on several RLIDB watercourses with the result mimicking a more natural pool-riffle sequence, providing heterogeneity to the flow and associated ecological benefits to the watercourse.

7 Dead Wood

Background

Dead wood is a key component of ecosystem functioning providing habitats and micro-habitats for lichens, fungi, saproxylic invertebrates, nesting birds, reptiles and amphibians, and mammals. Large piles of brash and deadwood debris located along quiet watercourses may also contain natural cavities offering potential resting sites and breeding places for otters and other animals.

Approach

The RLIDB routinely creates piles of brash and deadwood, as a result of its tree works, along its watercourses, where space allows.

8 Fencing/Prevention of Poaching

Background

Livestock farming can have adverse impacts upon watercourses, causing erosion of the bank by excessive trampling, increased surface runoff via soil compaction, and loss of soil, sediment and unwanted nutrients into the watercourse, with resulting damage to aquatic life through de-oxygenation of the water column and smothering of the channel bed.

Approach

Where opportunities arise, and funding is available, the RLIDB will install fencing to protect sections of watercourse banks, and thus provide a buffer between grazed areas and the watercourse. Areas between the fencing and channel are colonised by semi-natural habitats providing further enhancement of the riparian corridor.

Best Practice Guidance

Buisson, R.S.K., Wade, P. M., Cathcart, R. L., Hemmings, S. M., Manning, C. J. & Mayer, L. (2008). *The Drainage Channel Biodiversity Manual: Integrating Wildlife and Flood Risk Management.* Association of Drainage Authorities and Natural England, Peterborough.

Environment Agency. (2014). *Environmental Good Practice Guide: Guidance to help you maintain your watercourse in River Maintenance Pilot Areas.* Environment Agency, Bristol.

Additional References:

RSPB, EN & ITE (1997, reprint 2012). *The Wet Grassland Guide: managing floodplain and coastal wet grasslands for wildlife.* Royal Society for the Protection of Birds, English Nature & the Institute of Terrestrial Ecology

RSPB, NRA & RSNC (1994, reprinted 2001). *The New Rivers & Wildlife Handbook.* Royal Society for the Protection of Birds, National Rivers Authority & RSNC.

Case Study: Stretford Brook

Stretford Brook lies to the south-west of Leominster and flows into the River Arrow. The Brook is a Local Wildlife Site (LWS) supporting a rich flora including yellow water-lily, water avens and marsh speedwell, with black poplar occurring along the margins. The brook has a mixed substrate bed with a vague pool-riffle sequence and alternate silt and gravel bed substrates.

Prior to RLIDB management in 2017, the brook had been unmanaged for a number of years and suffered from overshading, accumulation of debris with large limbs blocking the channel, formation of erosion holes, soil/substrate loss and associated smothering of bed gravels, and a lack of pollard management.

Maintenance of the biodiversity interest of the watercourse required appropriate management of the bankside vegetation to provide areas of both light and shade along the channel, protection of short sections of bank to prevent further erosion and loss of bank soils, and management of the mature and veteran pollards along the margins.

Over the winter of 2017, the RLIDB undertook works which included laying existing lines of young alder along the bank while retaining suitable specimen trees, creating several soft-engineered 'live' bank deflectors to minimise further erosion, and pruning neglected pollards along the watercourse. This restored bed gravels, reduced the dense shading of the channel and created a good structural mix of bankside vegetation, with dense cover for nesting birds, otters and other animals.