water for wildlife

THE wildlife TRUSTS

Managing Woody Debris in Rivers, Streams & Floodplains

Protecting **Wildlife** for the Future

Managing Woody Debris in Rivers, Streams & Floodplains

This booklet aims to promote best practice to farmers, riparian landowners, site managers, drainage boards, anglers, foresters, local authorities, highways engineers, water policy makers, teachers, students and the general public.

Branches, large limbs, root boles or entire trees that have fallen into rivers are commonly referred to as Large Woody Debris (LWD). Accumulations of smaller branches, twigs and leaf litter are known as Coarse Woody Debris (CWD).

Woody debris is a vital component of our watercourses and its removal can severely degrade their health. The positive ecological contribution of LWD has often been overlooked or downplayed, while impacts on water flow and erosion have been misunderstood or exaggerated. This booklet seeks to dispel some of the myths and summarise the latest thinking.

Large Woody Debris (LWD)

Coarse Woody Debris (CWD)

Distribution of Woody Debris

Watercourses containing large amounts of woody debris, including log jams, are not particularly common in England and Wales (see map). It tends to be extremely localised and restricted to steep-sided headwater woodland streams often referred to as cloughs, pingles, dingles, sprinks, drumbles or dumbles.

Why is it Important?

The rôle of woody debris in the healthy functioning of freshwater ecosystems has become increasingly recognised in research carried out in different parts of the world since the 1980s. LWD is beneficial in some of the following ways…

Steep wooded banks provide the best conditions for the input of woody debris

Stabilises river banks and beds

LWD can be seen as the 'backbone' of the watercourse; its presence can help protect a stream from the erosion of beds and banks by resisting and deflecting flows. It also assists with the trapping and retention of sediments, organic matter and CWD.

Increases floodwater storage

Woody debris helps regulate the energy of running water by decreasing the velocity. Thus the 'travel time' of water across the catchment is increased.

Provides habitat for fish

LWD helps provide shelter from high velocity flows, shade, feeding, spawning and nursery sites, territory markers for migratory fish and refuges from predators. Research in the USA found that pools created by logs and branches provide over 50% of the salmonid spawning and rearing habitats in small streams.

Fish live in trees too!

Helps create river structure

Creates niche habitats

LWD adds complexity to the channel and helps to create new sediment pathways resulting in a range of habitats including chutes, pools, submerged and exposed sediment bars all of which, in turn, influence water temperature and additional micro-habitats for a wide range of aquatic plants and animals.

Provides space and food for colonisation

CWD and LWD provide a prolific range of surfaces including splits and hollows, in which algae, microbes and invertebrates can colonise. These tiny organisms are crucial as they make up the base of the aquatic food chain and provide food -directly and indirectly- for all the creatures associated with the watercourse including mayflies, stoneflies, caddis, crayfish, trout, dippers and otters.


Mayfly nymph


Crayfish


Lipsothrix grub


Hotspots of biological activity

Supports invertebrate life cycles

Research carried out in the UK identified 147 invertebrate species strongly associated with CWD (Godfrey, 2003). These include the UK Biodiversity Action Plan (BAP) cranefly *Lipsothrix nobilis/nigristigma*, the nationally scarce hoverfly *Chalcosyrphus eunotus*, and the rare lowland riffle beetle *Macronychus quadrituberculatus* all of which have a larval stage developing in CWD. Many aquatic invertebrates have a terrestrial adult stage. Woody debris that protrudes out of the water helps dragonflies and "river flies" like mayflies, stoneflies and caddis species to emerge from the larval to the adult stage of their life cycle.


Chalcosyrphus eunotus


Lipsothrix nobilis/nigristigma


Club-tailed dragonfly using LWD as an emergence site

Provides cover and perches

Insects, birds, amphibians, reptiles and mammals all use CWD and LWD as foraging, resting and lookout sites.

Otters use woody debris as secure resting sites

Improves water quality

One of the main functions performed by woody debris is the removal of fine silt from the system by creating silt 'benches' immediately upstream. This allows oxygenation of deposited silts, thus improving water quality. This process also helps to prevent gravels from becoming silted over.

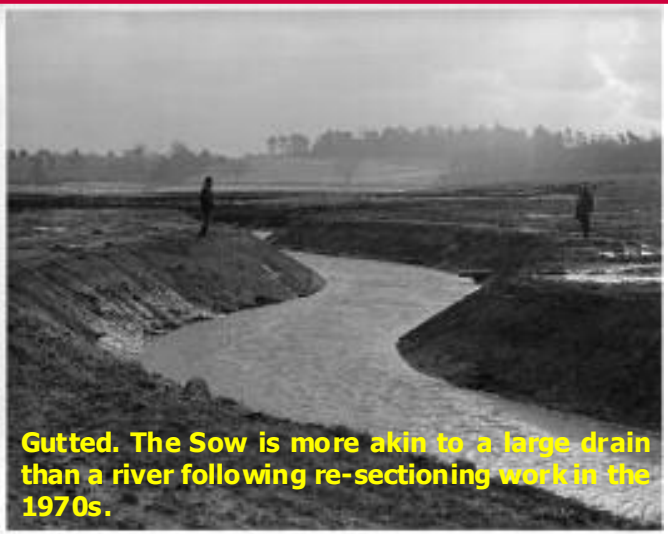
Assists re-colonisation

Scour pools formed by woody debris can be very important for watercourses that are prone to low flows or drying out completely. Animals living in these pools provide a reservoir of species that migrate and colonise the rest of the watercourse when flows increase. CWD also helps to protect species from the adverse effects of freezing or drying out.

Stores carbon

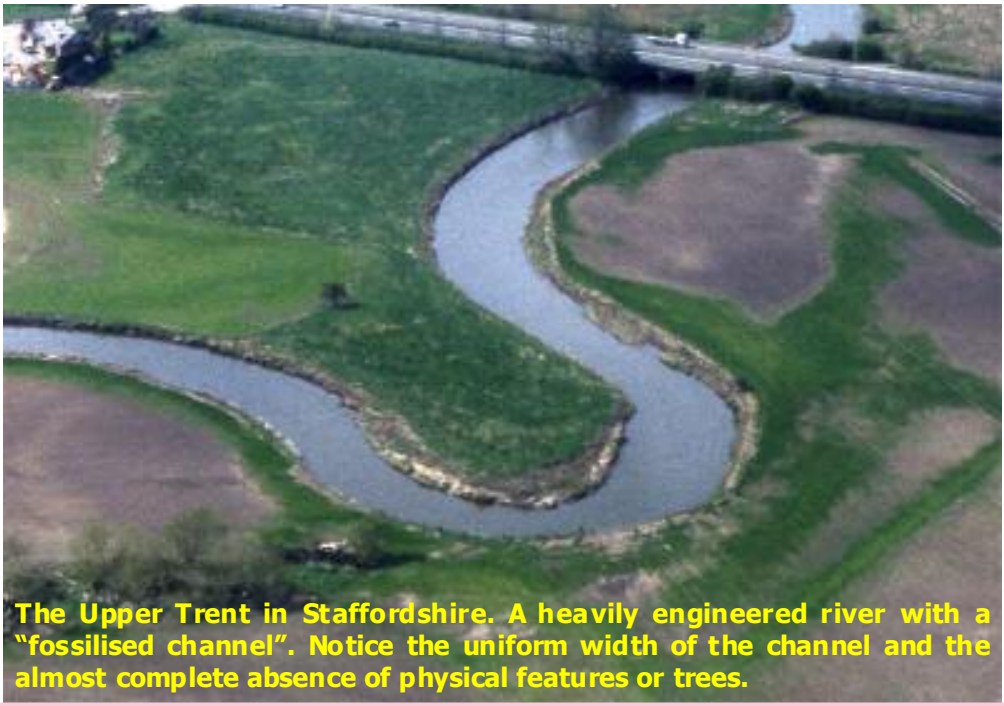
Woody debris helps to store carbon in the long-term, thus mitigating the effects of climate change.

Nature of the Challenge



Gutted. The Sow is more akin to a large drain than a river following re-sectioning work in the 1970s.

Over 85% of lowland rivers in England have been modified, deepened and straightened to provide defence for settlements and farmland established on the floodplain. LWD has traditionally been seen as a nuisance and is still referred to as a "blockage" or "snag". A great deal of taxpayers' money has been spent on removing LWD and CWD dams. Large-scale removal of woody debris and the "pioneer clearance" of tributary streams can take literally hundreds of years to recover.



The Upper Trent in Staffordshire. A heavily engineered river with a "fossilised channel". Notice the uniform width of the channel and the almost complete absence of physical features or trees.

Upper Severn at Welshpool. A river of similar size to the Trent which has suffered fewer modifications in recent times and retains meanders, riffles and backwaters. In the past vast quantities of CWD accumulated in these backwaters.

Problems can be exacerbated by a lack of ongoing input of both LWD and CWD into streams. Overgrazing, especially by sheep, and bankside poaching can mean that trees in the riparian zone are failing to regenerate. Over time this could result in a reduction and, ultimately, a cessation of woody debris input.

Over-zealous coppicing programmes, i.e. too much, too quickly, can also disrupt stream ecosystems adversely and reduce woody debris input for many years. River managers, fishery, forestry and agri-environment scheme staff are encouraged to consult more widely before embarking on large-scale projects. Surveys should be commissioned and a monitoring scheme incorporated to assess any changes.