3.0 Habitat projects on your river

To understand the full potential of your river, and the extent of the problems it faces along with suggested solutions, a good starting point might be the technical assessment and guidance report produced by a professional ecologist. The WTT's own Advisory Visit (AV) scheme makes this professional service available to all for free – asking only for travel costs of the consultant who performs the visit (**http://www.wildtrout.org/index.php?option=com_content&task=view&id=166&Itemid=150**). Alternatively a project proposal or set of technical notes may have been prepared for you as part of a TinTT consultation or by another conservation organisation. The primary outputs of each of these reports will include a list of the most important issues faced by your river – along with suggestions to tackle those issues. These solutions can be read as a list of objectives for a habitat improvement project and will allow the works to be costed and scheduled. Happily, clear aims and objectives are also an important step in monitoring habitat work (**section 2.1.1**).

Many of the typical challenges associated with the rural reaches of both groundwater-fed and upland rivers are identified in the WTT's "**Chalkstream Habitat Manual**" and "**Upland Rivers Habitat Manual**" respectively (both available for download at **www.wildtrout.org**). Additionally, there is also a suite of issues that typically occur along the urban reaches of all rivers. A number of important characteristically urban issues are outlined in the following section.

MONITORING AND HABITAT PROJECTS GO HAND IN HAND

supported by

Environment Agency

Esmée Fairbairn Foundation

3.1 Typical Urban-River issues

3.1.1 Invasive plant species

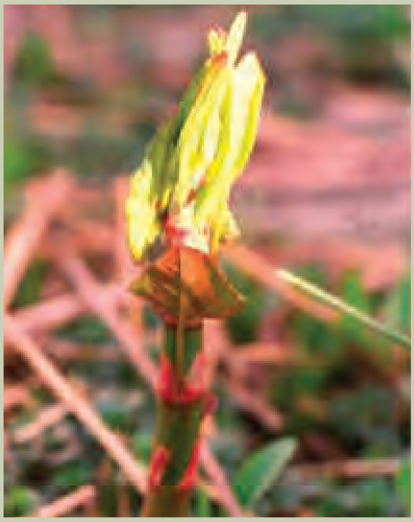
Huge stands of non-native invasive plants are common along urban river corridors, especially **Himalayan Balsam** (*Impatiens glandulifera*) and **Japanese Knotweed** (*Fallopia japonica*).

Himalayan Balsam is a relative of the busy lizzie and is known by a wide variety of common names, including Indian balsam, jumping jack and policeman's helmet. It is a tall, robust, annual producing clusters of purplish pink (or rarely white) helmet-shaped flowers. These develop into seed pods that open explosively when ripe, shooting their seeds up to 7m (22ft) away. Each plant can produce up to 800 seeds. Introduced to the UK in 1839, it is now naturalised, especially on river-banks or any areas of freshly disturbed earth that seeds may encounter. Himalayan balsam tolerates low light levels and, in turn, tends to shade out other vegetation – leaving behind large areas of bare earth during winter die-back. Although quite attractive to honeybees (*Apis mellifera*), when Himalayan Balsam excludes native wildflowers and plants – it also reduces the diversity of insects that depend on those native plants. Moreover, the bare earth banks are liable to collapse and wash away during winter floods – choking spawning gravels and suffocating the eggs of trout and salmon in the process. The main method of control, and usually the most appropriate, is pulling or cutting plants before they can flower and set seed in late summer (July/August). Volunteer conservation groups and authorities regularly organise 'balsam bashing' work parties to clear the weed from marshland and riverbanks and the most suitable months for such events are May, June and July. Chemical control is possible – but before using weedkillers alongside waterways it is necessary to contact the appropriate national regulatory body (i.e. SEPA, EPA, Environment Agency or NIEA according to location) and become licensed for the specific procedure. Typically, a glyphosate-based weedkiller, such as "Roundup" or "Tumbleweed" is recommended. Glyphosate is a non-selective, systemic weedkiller that is applied to the foliage. It is inactivated on contact with the soil, so there is no risk of damage to the roots of nearby native vegetation, but care must be taken that the spray doesn't drift onto non-target foliage. Glyphosate is most effective when weed growth is vigorous. This usually occurs at flowering stage but before die-back begins; with most weeds, this is not earlier than mid-summer. With both physical and chemical methods, it may take several seasons to obtain good control due to the germination of more weed seedlings from the seed-bank within the soil and it is important to start the work from upstream and work down, reducing the risk of re-infection of a treated site.

YOUNG SHOOTS (*ABOVE*), CLOSE-UP OF FLOWER (*RIGHT*) AND FLOWERING PLANTS (FAR *RIGHT*) OF HIMALAYAN BALSAM

JAPANESE KNOTWEED STAND ON THE RIVER CRAY

YOUNG SHOOTS OF JAPANESE KNOTWEED (*PICTURE FROM* WWW.BIOLOGY.CLC.UC.EDU)



Japanese Knotweed was introduced to the UK as an ornamental plant during the 1800s. It is commonly found today along railway lines, riverbanks, roads and footpaths, in graveyards, on derelict sites or anywhere that it has been dumped, dropped or deposited. It has large, oval green leaves and a hollow stem. Usually in early spring (although it can be later in the year) the plant produces fleshy red tinged shoots. These can reach a height of 1.5 metres by May and three metres by June. This plant can grow as much as 2 cm per day and will grow in any type of soil, no matter how poor; in fact, it has evolved to germinate through hardened volcanic lava – and as such is capable of destroying building foundations and concrete or asphalt floors/pavements. Towards the end of August, clusters of cream flowers develop and then produce seeds that are sterile; the plant dies back between September and November. Beneath any stand of Japanese Knotweed there is an extensive underground root (*rhizome*) network that can extend up to approximately 7 m in circumference around any individual plant. The spread of the plant is vegetative (all new plants are created by fragments of existing plants) and root fragments as small as 0.8 grams (about as big as a pea) can grow to form a new plant. The speed with which it has spread to all parts of the UK has been spectacular when you consider that it does not leave seeds behind but grows from pieces of the plant or root system that are cut and transported by people or by water. Because Japanese Knotweed does not originate in the UK, it overwhelms our native species and is able to spread unchecked.

Once established, Japanese Knotweed shades out native plants by producing a dense canopy of leaves early in the growing season. Although Japanese Knotweed is not toxic to humans, animals or other plants, it offers a poor habitat for native insects, birds and mammals. Under the **Wildlife and Countryside Act 1981 / Wildlife (Northern Ireland)** Order 1985 it is an offence 'to plant or otherwise encourage' the growth of Japanese Knotweed. This could include cutting the plant or roots and disturbing surrounding soil if not correctly managed. Although there are a number of options available for the treatment of Japanese Knotweed, the majority of these require a number of years in order to be effective. Eradication is highly specialised work controlled by very strict protocols governing the treatment of plant/rhizomatous material arising from eradication work. An interesting development at the time of writing is the approval for the UK release of an apparently "host-specific" species of psyllid louse as a biocontrol measure (**http://www.telegraph.co.uk/gardening/7398766/What-is-the-psyllid.html**). It is hoped that this will be both successful and will avoid any unintended consequences. A comprehensive account of the nature and eradication of Japanese Knotweed was given at the inaugural "Urban River Champion's Conclave" held in Sheffield in August 2009 (**http://urbantrout.blogspot.com/2009/08/triumphant-urban-river-conclave.html**). The take-home message is that Japanese knotweed removal and legal disposal is far from simple – even for the professionals!

GOOD HABITAT AT MALIN BRIDGE IN SHEFFIELD (NOTE ARCH OF UPSTREAM BRIDGE IN BACKGROUND AND COMPARE TO THIS SAME ARCH IN THE "DURING" AND "AFTER" PHOTOS ON **SHEET 7/13** IN THIS SECTION. ALL THREE PHOTOS ARE TAKEN FROM THE SAME FIXED POINT)

3.1.2 Fly tipping/trash

(**see section 2.2.3**)

3.1.3 Damaging modification of river channel

Urban rivers are used by and affect many members of society so there are many different interests that must be balanced in the management of these valuable watercourses. Some people like to see more formal, heavily managed parkland and others prefer our native wildlife and flora. The needs of kayakers, dog walkers, anglers and bird watchers may share many common factors – but can also differ on specific, significant details. Additionally, what might be good for showcasing industrial heritage may be bad for the resident wildlife. For example, the Sheffield Don and the East Lancashire Colne have both seen recent pressure for weirs to be reinstated to recreate a particular period in the history of each river. Such reinstatements could seriously degrade habitat upstream and downstream of the weirs as well as restricting free movement of fish between high quality habitat patches. In all these cases of "river-user" priorities, the role of the local TinTT chapter will be to represent the needs of the flora and fauna of the river corridor.

A very serious concern for many riverside residential and business properties is the threat of catastrophic flooding of the river. However, flood alleviation schemes have the potential to be the most ecologically destructive human activity shaping the river channel. Consequently, management of flood risk is an area of critical importance for river custodians such as TinTT chapters. It is absolutely essential that the most up-to-date approaches and information are utilised in effective flood risk management – so that damage to property can be minimised – but equally so that destruction is not wrought on the environment for absolutely no reduction in flood risk.

A typical example of ecologically damaging 'flood alleviation' work in rivers is the removal of trees and logs that have fallen into the channel. This "large woody debris" (LWD) plays a vital role in the river, cleaning gravels and scouring out deep holes where fish can shelter but, at a catchment scale, LWD smoothes out and prolongs the flow of flood water at a lower maximum depth. Rivers without much LWD tend suffer from short but severe flood events with much higher maximum depths. Removal of bankside vegetation and dredging of gravel/cobble shoals is also common – and highly destructive for wildlife in and around the river. In some cases, e.g. where washed-down trees have blocked bridge arches, removal is clearly absolutely appropriate. However, it is extremely worrying to note that many well-intentioned practices that destroy habitat and wildlife will either be of no benefit to flood risk – or may even cause a greater flooding risk. Simplifying the channel by removing gravel side-bars, stable LWD, riverside woodland and mid-channel islands tends to promote more rapid and more simultaneous arrival of peak flood-flows at bottlenecks such as bridges or culverts. Since such bottlenecks are usually associated with roads or buildings, promoting flooding at these points is a highly undesirable consequence of dredging and tree removal. There are plenty of examples of these practices leading to more regular and greater flooding (e.g.[3 and 4]).

Many typical features of urbanisation increase the risk of rivers flooding during heavy rainfall. For instance, the use of tarmac and concrete and the removal of grass, flowers and trees from land reduces the amount of porous ground that could "soak up" rainfall. On top of this, when we build more roofing, we increase the total surface area of hard impermeable surfaces even more. The combined effect of this is to greatly increase the speed at which rainfall washes into rivers through our drainage systems. Such "flash flooding" is a big problem considering that this water must pass through bridges that were often built long before there were so many homes and businesses within the flood plain of most rivers. Each bridge arch can only let so much water through, so when we pour water at much greater rates into our drains, the river is at risk of backing up above the bridge and causing a flood. These facts are at the heart of successful alleviation of flooding risk and show that it is fruitless to dredge river channels between pinch points such as bridges. Instead, because much of the problem is caused by land-use and drainage systems, the problem must be solved outside the river channel itself. Too often, the adopted approach is to start digging and felling trees in the channel.

On a brighter note – we should remember QWAG's winning slogan "flood the parks, not the properties" which was critical to the reinstatement of the natural channel of the river Quaggy (**http://www.qwag.org.uk/quaggy/flood.php** and **section 2.2**).

BRIDGE ON GLAZERT WATER IMPOSES THE HYDROLOGICAL LIMIT ON THIS REACH

The Quaggy, previously entombed in a man-made concrete channel, has now been broken out and reattached to its floodplain. The creation of new, upstream flood storage areas now reduces the risk of flooding to downstream properties and has also dramatically increased the biodiversity and conservation value of its river corridor flora and fauna (**Photos this page**). It is also a dramatic example of the value of extending floodwater storage capacity rather than attempts to dredge channels between bridges. Other highly effective (and simultaneously more environmentally friendly) flood alleviation measures include techniques to slow and reduce the inputs of flashy surface runoff into the river from its surrounding catchment (e.g. water butts as promoted very successfully in the Quaggy catchment). The use of so-called **SUstainable Drainage Systems** (SUDS) reduces the impacts of new building on peak run-off. Typically, SUDS might include the installation of balancing ponds with 'throttled' outfalls that slowly release stored floodwater following peak rainfall as well as grassy areas and the use of porous hard surfaces that soak up rainfall (e.g. pervious concrete, bricks and paving as well as porous asphalt). In addition to urbanisation leading to greater flash inputs of surface water, rural land use upstream of towns and cities can compound the problem. As noted in the **WTT Upland Rivers Habitat Manual**, probably the biggest single issue affecting rural upland catchments is poorly controlled surface water run-off. Changes in agriculture since the Second World War have generally increased stocking levels on grassland, whilst arable cultivation has been undertaken in ever increasing field sizes, using larger and heavier machinery. Ground compaction on both land types has thus become greater, leading to increased speed of run-off. **See the remainder of section 4 of the Upland River Guidelines** (**http://www.wildtrout.org/images/PDFs/Upland_Manual/uplands_section4.pdf**) for tackling these issues. The end result is that rain water hits the river more quickly, producing flooding in downstream urban areas.

3 Bonacci, O. and Ljubenkov, I. (2008) "*Changes in flow conveyance and implication for flood protection, Sava River, Zagreb*" Hydrological Processes 22, 1189–1196

4 Pinter, N, Ickes, B.S., Wlosinski, J.H., van der Ploeg, R.R. (2006) "*Trends in flood stages: Contrasting results from the Mississippi and Rhine River systems*" Journal of Hydrology 331, 554–566

DE-CULVERTING OF THE RIVER QUAGGY AND CONNECTION TO FLOODPLAIN LEAD TO THIS LOVELY WETLAND ECOSYSTEM. *PHOTOS:* THE RIVER RESTORATION CENTRE

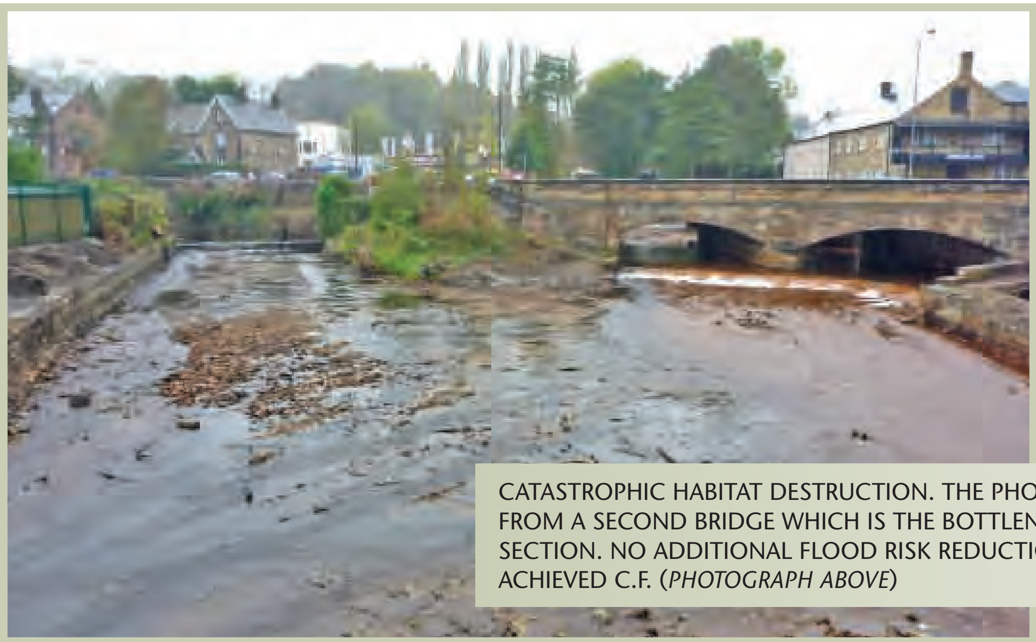
DURING WORKS PHOTO – DRAMATIC CLEARANCE BUT AT LEAST FUNCTIONAL CROSS SECTIONAL VARIATION IN DEPTH REMAINS - ALONG WITH A VARIETY OF SUBSTRATE PARTICLE SIZES FROM COBBLES/SMALL BOULDERS TO GRAVEL. COPPICED TREES WILL PROVIDE BUSHY LOW COVER THROUGH RE-GROWTH

3.1.4 Fragmentation of habitat

The most common restrictions on access to fish habitat in urbanised areas are imposed by weirs and culverts. Impassable barriers or severe restrictions to free passage may also arise via:

- Dredging to such an extent that flowing water is too wide, shallow and lacking in cover for fish to pass through (***photo below***)
- Spawning tributaries being forced to flow over vertical waterfalls into the main river channel as a result of:
  - heavily engineered main-river banks (***e.g. photo right***)
  - rampant erosion of the main river channel, perhaps due to unsympathetic forestry drainage

TRIBUTARY OF THE AFON TAF DISCHARGING VERTICALLY OVER STEEL PILINGS THAT LINE THE MAIN RIVER CHANNEL



CATASTROPHIC HABITAT DESTRUCTION. THE PHOTO IS TAKEN FROM A SECOND BRIDGE WHICH IS THE BOTTLENECK ON THIS SECTION. NO ADDITIONAL FLOOD RISK REDUCTION HAS BEEN ACHIEVED C.F. (*PHOTOGRAPH ABOVE*)

Particularly in gravel-spawning fish, there is a vital need for free movement between different kinds of habitat at specific stages in their lifecycle (spawning, juvenile and adult). Ideally, fish would be able to swim freely between adult holding pools, sheltered juvenile shallows and clean, well-irrigated gravel mounds. Where fish cannot overcome a barrier to upstream migration, their life must be lived in perhaps less-than-ideal habitat downstream of that structure.It should not be assumed, however, that the installation of a fish pass is automatically the most desirable solution to fish migration. Instead, fish passes should be considered a (vital) last resort which, when properly designed and installed, can allow the upstream movement of some fish over previously impassable barriers. Of course this is absolutely desirable, but it does not equate to there being no barrier! Only a proportion of fish will be able to find their way up the engineered structures. Moreover, the installation of a pass onto an un-modified weir does nothing to improve the habitat in the sluggish water impounded upstream of the structure. Not only do you get far better fish passage – but you hugely improve the upstream habitat when weirs are knocked down – either in part or in full (**see sections 3.1.5 and 3.2.2** for obtaining permissions). This improvement in upstream habitat by the removal of impounding structures has been associated with 10-fold increases in trout and salmon biomass (e.g.[5]). Strategically placed notches in the lip of a weir (perhaps coupled with a suitable fish pass structure if necessary) could also enhance the accessibility and appreciation of important heritage features – by making larger sections of the weir construction available to visitors.

The increased current velocity upstream of lowered/removed weirs can then be put to good use in generating localised scour using boulder or stable LWD placements to clean and sort gravels (for spawning) as well as generating scoured "pots" in the stream bed for adult and juvenile fish.

5. O'Grady (2006) *Channels and challenges. Enhancing salmonid rivers* Irish Freshwater Fisheries Ecology & Management Series: Number 4, Central Fisheries Board, Dublin, Ireland – available from *http://www.cfb.ie/Notices/channelsandchallenges.htm*"

SMALL WEIR ON RIVER WANDLE BEFORE REMOVAL OF TOP COURSES OF STONE

THE SAME WEIR AFTER THE REMOVAL OF TOP COURSES OF STONE. NOTE GRAVEL RAMP THROWN UP BELOW THE LOWERED WEIR

PRE LOWERING PICTURE OF GREY ANKLE/CALF DEEP SILT BEHIND WEIR

AFTER LOWERING (NOTE CENTRAL FAR BANK TREE FROM PREVIOUS PICTURE); SHOWING CLEAN SILT-FREE GRAVEL BED

3.1.5 Riparian ownership

Land ownership can be extremely complicated along urban river corridors due to the sheer number of different owners. There can also be confusion between what are "adopted" or "unadopted" highways and access paths by local councils and a general suspicion of why local groups may want access to sections of urban river in the first place... ownership in rural estates is often far simpler. In many cases, the best option is knocking on the doors of the various riverside businesses and properties to explain what your group's motives are in caring for the river. Local councils or wildlife trusts may have compiled their own lists of riparian owners (especially if there is a local habitat "Biodiversity Action Plan"; **http://www.ukbap.org.uk/default.aspx** in place for the river). Accessing the Land Registry (**http://www.landregistry.gov.uk/**) will almost certainly be required at some point – although it is by no means certain that even this approach will resolve all ownership queries. However, it is essential that all owners who can be identified are contacted and their permission sought for your group to access the river and carry out working parties, habitat works and perhaps even fish those sections of river. Do, also, keep a record of the various attempts made to obtain such permissions (including keeping on file any responses that are issued – in case of any dispute that may arise).

Having dealt with the rich variety of challenges in caring for urban rivers, it might be the time to get in the river and tackle some habitat enhancement. This is covered next...

3.2 Habitat works

3.2.1 General Principles

In order for habitat works to be successful, it is important to identify the most influential factors affecting sensitive keystone species (e.g. trout and grayling) and the general health of river corridor plant and wildlife communities. This raises the very important (and often overlooked) prospect that:

The solutions to degraded urban river corridors may lie a considerable distance away from the local reach of interest.

Therefore, following the project planning process outlined in detail in the **Wild Trout Survival Guide** and the **Upland Rivers Habitat Manual** is vital for effective habitat enhancement. The quality of, and access to, spawning habitat is an obvious example here (i.e. you may be able to restore degraded gravel riffles but you also need to get fish up over a weir from lower down the river system before the whole fishery can benefit). **See sections 5.3 and 5.1/5.2 of the Upland Rivers Habitat Manual** for gravel management and fish passage easement respectively (**see also section 3.1.4** of this document). Attacking problems at their distant source is equally relevant to the control or eradication of invasive plant species from the top of a catchment downwards. Such eradication is essential in order to restore floral (and associated invertebrate/vertebrate foodweb) biodiversity in the urban river corridor. So:

Be sure to look for problems at their source and tackle them at source when possible.

Again, because both "chalkstream" and "upland" rivers occur in urban areas, identifying particular problems – and choosing solutions should be done with extensive reference to the relevant WTT manuals. In other words, all urban river champions (including TinTT members) should very thoroughly absorb and apply the contents of relevant guidance, including the Chalkstream Habitat Manual or Upland Rivers Habitat Manual according to the nature of their local river. Remember, too, that advice is but a phone call to the WTT or EA Fisheries Offices away. In addition to obtaining the permission of the relevant land owner(s), it is likely that the potential impact on flood risk and river corridor biodiversity of planned habitat works will need regulatory approval. The following section introduces this process.

3.2.2 The Land Drainage Consent process

The process, commonly referred to in England and Wales as "Land Drainage Consent" (or its regional equivalent) is of central importance to almost all urban river habitat works. This is the means by which potential flood risks and any threats to biodiversity posed by works are assessed and approved. The issue of flood risk is likely to be of heightened sensitivity in urbanised reaches of river. Therefore, the process is given concise consideration in the following paragraphs. Specific guidance on when consent is likely to be required and the elements that make up a good application are given under the appropriate headings. It is important to note that further checks need to be made to ensure compliance with your own regulatory authority if it is not the E.A.

When is it needed?

- *E.A. requires that consents are sought for all watercourses designated as "main river" (contact local E.A. for designation of proposed site) for works within the channel or within eight metres of the channel boundary*
- *WTT advise that all works potentially influencing flood risk in urbanised areas (with properties/ businesses adjacent to the river) are all subjected to the Land Drainage Consent process*

What makes a successful application?

- *Brief but precise account of what the works are designed to achieve and why each outcome is desirable*
- *Sufficient detail is required in all plans to identify how any introduced habitat features (e.g. logs) will be anchored in place (plan and elevation view with dimensions of anchors)*
- *Sufficient detail and clarity in all plans to show maximum dimensions of those features, their location in the channel and the proportion of the channel that will be occupied by them (plan and elevation view)*
- *At least a six figure National Grid Reference (e.g. SK 310 931) to identify the location of the works , accompanying a plan of the proposed work site, and the length of river to be incorporated upstream and/or downstream of the grid reference point*

The paperwork and information about any attendant processing fees can be obtained on request from the Flood Risk Management representative for your local area who will be contactable by phoning your regulatory authorities general enquiries number (e.g. 08708 506 506 for E.A., 028 9262 3100 for NIEA, 053-9160600 for EPA and 01786 457700 for SEPA). Have patience and determination when preparing and submitting applications. Also be prepared to accommodate and respond to feedback from the consenting authorities in your work proposals. Once this procedure has been successfully completed for one aspect of your project, future applications will be far easier and all parties will be entirely familiar with both the process and the personnel. A riverbank "pre-application meeting" between Flood Risk Managers, the applicant(s) and local fisheries and biodiversity officers will help the process to run smoothly.

3.2.3 Urban Adaptations

Where habitat restoration requires the installation or repositioning of large structural components in the channel (e.g. boulders or LWD), the basic approaches outlined in our existing habitat manuals will often be absolutely appropriate. BUT, extra special attention needs to be paid in urban rivers to what might happen if a habitat feature breaks free! Obviously, this care needs to apply to channels directly upstream of urban development as well as river channels surrounded by urban development. A useful checklist therefore would be as follows:

- **Commission a check for underground services** (electricity, gas, water/sewers) to be undertaken by your local regulatory authority so as to avoid damaging or disturbing service pipes

- **Use secure anchoring (e.g. *Photographs below*) to prevent structures breaking loose via:**
  - Use of 2-m lengths of rebar drilled through LWD placements and driven at 1 to 2m centres to full depth within the riverbed
  - Cabling (12-mm steel) LWD to mature living trees (as a failsafe backup to rebar pins if necessary)
  - Anchoring cables to drilled expansion bolts within stable structural walls in engineered channels

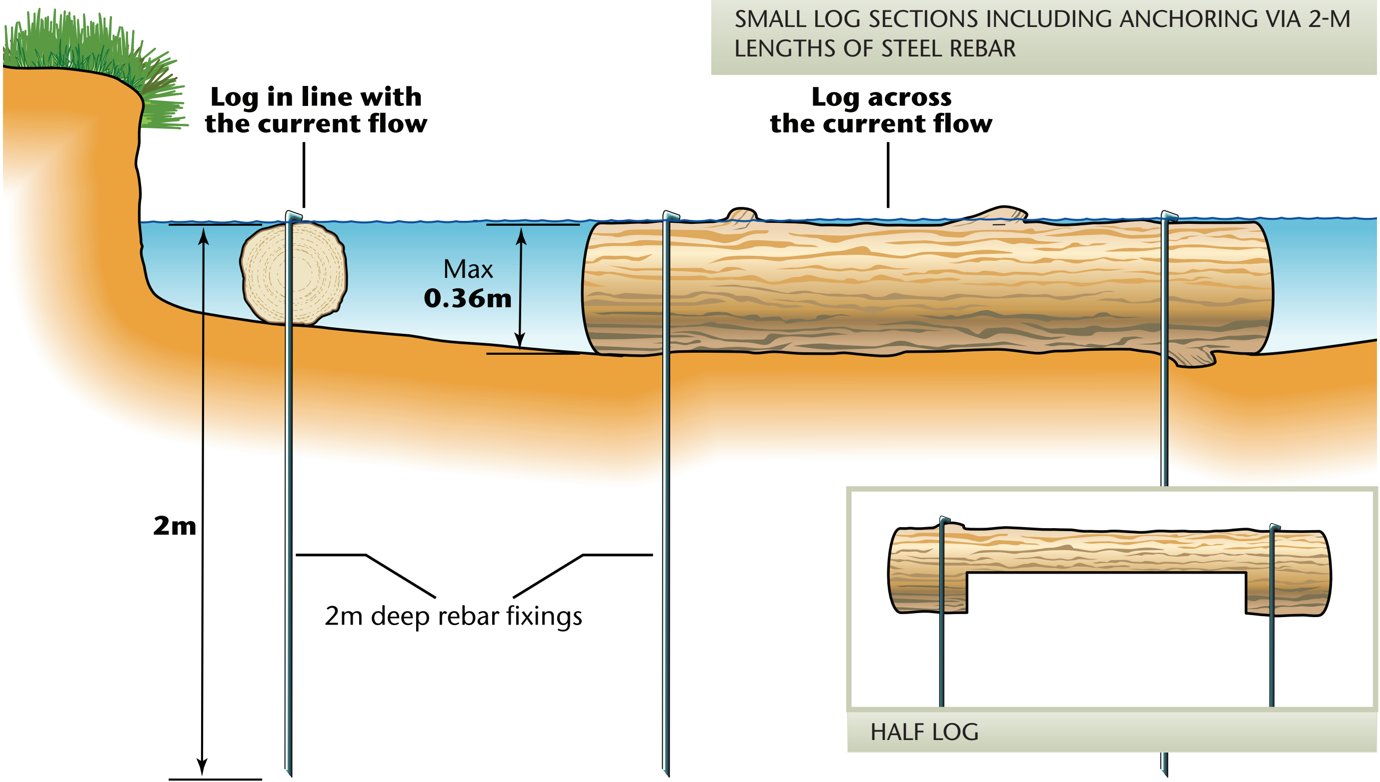
LWD CABLED TO LIVING TREE PICTURED DURING FALLING SPATE FLOWS ON DERBYSHIRE'S RIVER GOYT...

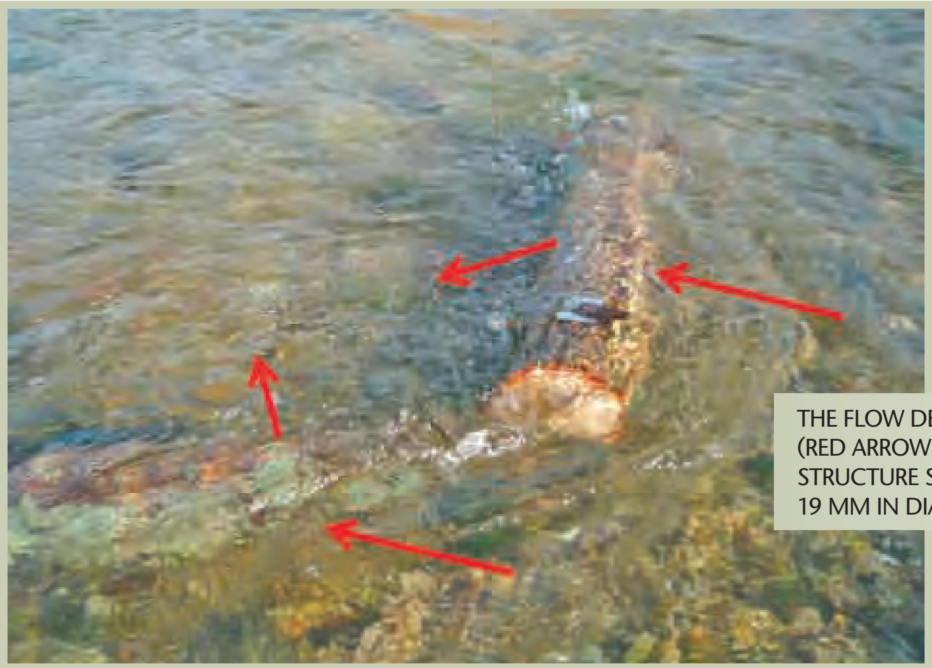
...JUST UPSTREAM OF BRIDGE PARAPET ACCUMULATING UNSECURED, NATURALLY-OCCURRING LWD

- **Consider splitting larger structures into smaller individual pieces**

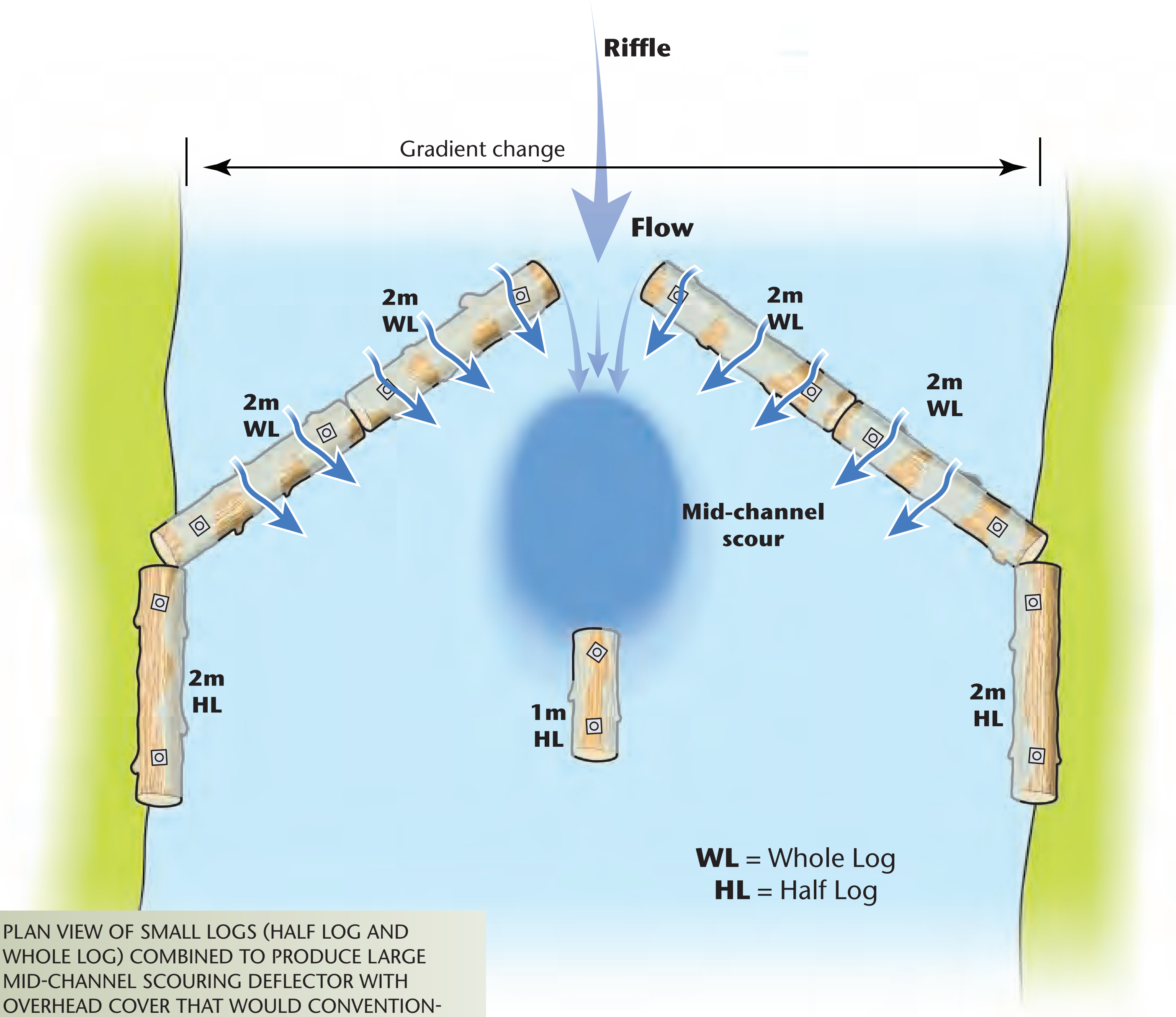
  (i.e. 3 or 4 small logs installed in the shape of a single, larger log). This poses a lower blockage risk in the event of individual logs being washed away (as shown in the **following figures**)

SMALL LOG SECTIONS INCLUDING ANCHORING VIA 2-M LENGTHS OF STEEL REBAR

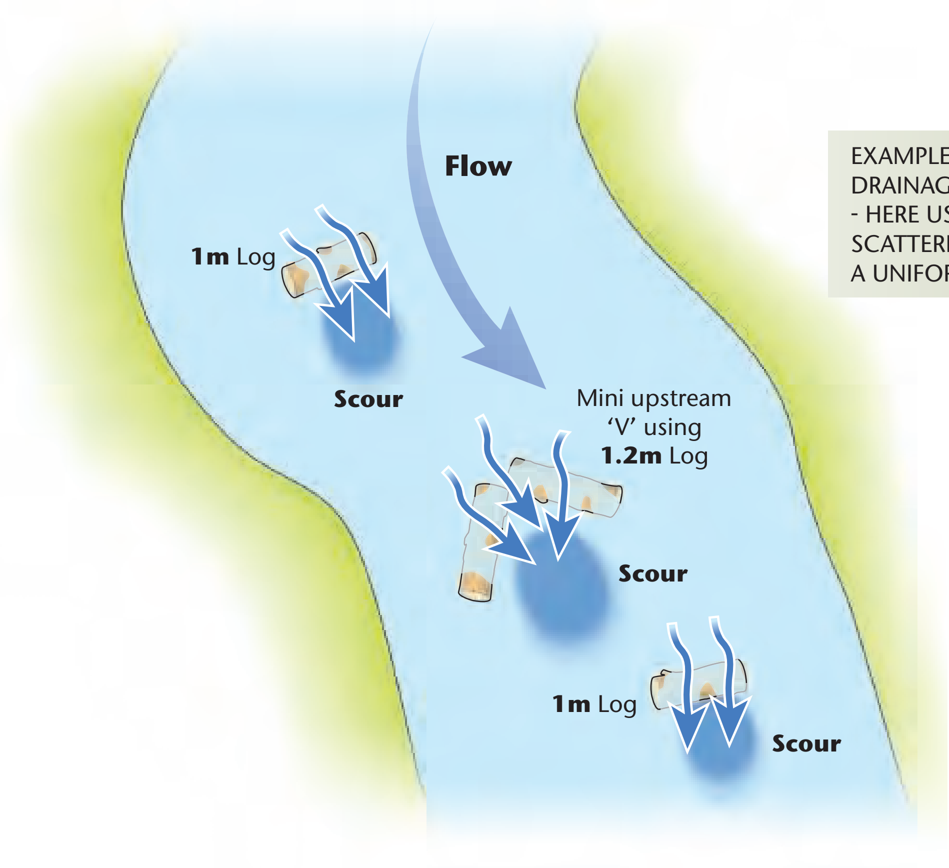




THE FLOW DEFLECTING AND SCOURING ACTION (RED ARROWS) PRODUCED BY A MINI "UPSTREAM V" STRUCTURE SECURED USING 2-M REBAR PINS 19 MM IN DIAMETER



PLAN VIEW OF SMALL LOGS (HALF LOG AND WHOLE LOG) COMBINED TO PRODUCE LARGE MID-CHANNEL SCOURING DEFLECTOR WITH OVERHEAD COVER THAT WOULD CONVENTIONALLY REQUIRE LARGE INDIVIDUAL TREES OR LOGS



EXAMPLE PLAN VIEW OF POTENTIAL LAND DRAINAGE CONSENT APPLICATION DIAGRAM - HERE USING SMALL LOGS TO INTRODUCE SCATTERED LOCALISED SCOUR POTS IN A UNIFORM RIFFLE.

Therefore, in common with the adoption of inventive new means of achieving community-engagement/ education and monitoring objectives, urban rivers require similarly inventive approaches to applying the advice contained in the Upland and Chalkstream Habitat manuals. So get out there with your eyes open and your thinking caps on. The WTT will be here to help with advice, guidance and/or practical assistance whenever appropriate across the U.K.

INNOVATIVE USE OF SMALL INDIVIDUAL COMPONENTS TO PRODUCE AN UPSTREAM V STRUCTURE TO PROMOTE LOCALIZED BED SCOUR. AGAIN, SECURE ANCHORING USING 2-M LENGTHS OF 19-MM DIAMETER REBAR HAS BEEN EMPLOYED TO ENSURE ROBUSTNESS