

GUIDANCE ON RECORDING WOOD IN MORPH SURVEYS

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INTRODUCTION

Natural River Wood: Wood is a feature of naturally functioning rivers. In the UK most wood entering rivers is buoyant. This means that it can move through river systems when the water is sufficiently deep for flotation and then accumulate at various locations within the channel or across the flood plain. As well as offering wood 'habitat', naturally functioning wood can form accumulations that can block or narrow channels, deflect flows of water and other materials, trap organic matter and sediment, and induce scour and deposition of sediment to form numerous physical features such as pools, bars and side channels. Thus, 'natural' wood in rivers provides wood habitat and is an important driver of the development-turnover of a diverse range of other habitats and the overall morphological complexity of the river and its floodplain.

Wood as a Traditional Construction Material: Wood has also been used by humans over many centuries to perform flow attenuation, deflection or reinforcement functions through the construction of features such as jetties, weirs, deflectors, bridges and bank reinforcement. These features are frequently constructed of wood hewn into geometric forms (posts, planks, sleepers), which are easily distinguishable from the natural wood load of the river. Over at least the last century, the wood has typically been treated to reduce decay and at the same time rendering the wood unsuitable as a habitat for river organisms.

Wood as a 'Natural' Construction Material: Recently, wood has also become a favoured material for building in-channel structures to help attenuate flood waters in natural flood management schemes or to aid river restoration. In these applications, the in-channel features are often constructed of unhewn, untreated wood pieces and the wood is usually strongly anchored to the river bed and banks. As a result, although these wood features attempt to emulate natural wood features and provide wood habitat, their lack of mobility prevents them from offering the range of associated physical habitats and the habitat dynamics and turnover offered by natural wood pieces in rivers.

The recent use of wood in NFM and river restoration schemes has resulted in a blurring of the distinction between wood as a traditional construction material and as a natural component of river environments. The result has been some understandable inconsistencies in MoRPh surveys recorded by different surveyors.

This note provides some guidance to support more consistent recording of wood-related features in rivers that recognises the above three broad situations in which wood may be observed in rivers and along their margins. It maintains the important requirement for MoRPh surveyors to 'record what you see not what you know', allowing artificial wood structures that are not 'maintained' to gradually merge with natural wood features within the river and to offer similar functions.

WHAT TO RECORD

Remembering that you should record what you see and not what you know, the following 'rules' can be used to record wood related features:

1. **Large Wood:** MoRPh records the abundance of 'large wood' on the bank tops, bank faces and bed of rivers. A piece of large wood should exceed 1 m in length and 10 cm in diameter and is separated from the parent tree or is an uprooted tree. Where any untreated wood is observed, even if it has been left by humans (e.g. felled trees, wood piles, leaky barriers), it should be recorded as part of the large wood observations in sections 2.2, 3.4 or 4.4, according to location, because it provides wood habitat. Where the large wood (for example a fallen tree or large branch) extends from a bank top across a bank face and/or across/into the channel bed, the relevant parts of the wood should be included in the wood abundance estimate in all of these areas.
2. **Organic Material:** includes pieces of wood that are less than 1 m in length and 10 cm in diameter and all other organic matter, particularly leaves and seeds. Organic material is only recorded on the bank faces and channel bed and its abundance is recorded according to its morphology:
 - a. **Organic material may be present as a distinct layer** not just a veneer of leaves in autumn but a continuous layer. For example, 'organic material' on the bank face usually appears as a continuous layer of leaves and twigs, that may be partly decayed but identifiable as 'leaf litter' or 'mulched' leaves, distinguishing it from 'earth' (a mixture of dark coloured silts, sands etc with humus, that is more mineral than organic) and 'peat' (a rare, semi-decayed material found in specific marshy conditions e.g. lowland fens and mires). On the river bed, 'organic material' is similarly seen as a distinct layer or patches consisting of whole or fragmented leaves, twigs or other small pieces of vegetation). Its abundance should be separately recorded as a natural bank face or bed material (in sections 3.2 / 4.1).
 - b. **Organic material may be present as distinct, discrete accumulations on the river bed or bank faces.** The abundance of such accumulations should also be recorded in sections 3.4 / 4.4). Note that such accumulations often build up around accumulations of large wood.
3. **Specific 'Naturally-Functioning' Wood Features:** These are recorded separately. In other words, certain features of the large wood are recorded in addition to being incorporated into the estimates of large wood abundance. These include:
 - a. **Fallen trees**, which may have fallen naturally or been felled and then left *in situ* and untethered are recorded as an abundance on the bank top and bank face and as a count within the channel (on the bed or suspended within the bankfull channel). A single tree could be recorded on the bank tops, bank faces and channel bed if it has fallen across all three locations.
 - b. **Large wood dams**, are counted on the channel bed. These are (or appear to be) naturally-formed features that cross the entire channel bed, comprised of single or multiple pieces of large and smaller wood that have the potential to interrupt/delay/pond back the flow of water when flows more than half-fill the channel and are untethered (or you cannot see the tethering).
4. **Specific Artificial Wood Features:** Whether constructed of treated or untreated, geometric / rough hewn or un-trimmed wood, these structures are clearly made and installed by humans and are fixed in place so that the wood cannot move freely.

- a. **Traditionally constructed structures** such as bank reinforcement, weirs and deflectors are readily recognised and can be unambiguously recorded as ‘Artificial Features’.
 - b. **Structures introduced as parts of NFM and river restoration schemes, when they are clearly fixed in place (e.g. by the use of pegs / posts, wire or burial in excavated areas of the bank)**, should be recorded as artificial structures.
 - i. **Where they emulate wood dams**, they should be recorded as intermediate weirs (defined as semi-permeable, stone / wood structures that extend across the entire channel width) in section 4.3.
 - ii. **Where they partly cross the channel bed**, they should be recorded as deflectors with the size (major / intermediate / minor) indicating how far they extend into the channel from one bank face, in section 3.3.
 - iii. **Where they are parallel to the flow and pinned along the bank face/toe**, they should be recorded as wood reinforcement in section 3.2.
 - c. **Relict elements of any of the above wooden structures that have been artificially-introduced in the past** and that are no longer performing their intended purpose e.g. vertical posts associated with either brush berms or bundles used as bank reinforcement; or wooden revetment (or toe-board) that has become separated from the bank face. These should be recorded as washed out reinforcement in sections 3.2 or 4.1 according to their location.
 - d. **Structures that have been artificially-introduced in the past but no longer appear to be constructed by humans.** Such artificial structures may have started to break up or have accumulated significant quantities of river-transported wood so that their artificial nature can no longer be seen (e.g., tethering pegs and wires washed out or buried, or covered by naturally-functioning wood). As well as being part of the large wood that is present (see 1. above), where appropriate they can be recorded in the same way as naturally-functioning wood features (see 3. above).
5. **Notes:** Although the above guidance should lead to largely self-explanatory survey data, it is often useful to use the notes section to clarify your records. This is particularly the case if your survey forms part of a repeat monitoring programme during which some features may evolve in terms of what you see rather than what you know (e.g. NFM wood weirs that evolve into apparently natural wood dams, or wood structures that decay and become washed out).

SOME EXAMPLES

Wood Dams or Intermediate Weirs?

Figure 1 illustrates some naturally-formed wood structures (D, E, F) and some artificial structures constructed by humans from unhewn and untreated wood (A, B, C). The wood in both types of structure should be incorporated into estimates of large wood on the bed and banks of the MoRPh module. In addition, because all of the structures cross the entire river bed, the artificial structures (A, B, C) should be recorded as ‘intermediate weirs’ and the natural structures (D, E, F) should be

recorded as 'wood dams'. While structure A is clearly constructed by humans, structure B looks more natural but its artificiality is revealed by the two wooden stakes supporting it at each bank face. Finally, the artificial nature of structure C, located in a dry river channel, is the single stake driven into the channel bed at the centre of the structure. No stakes or tethers can be seen in D, E and F because these wood features are naturally-formed, but it is easy to see how C could be recorded as natural in the future if the supporting stake were to collapse or be displaced or buried by accumulating wood and sediment. Also note that in addition to being an intermediate weir, the feature in C displays wood on the far bank top and bank face and also contains a fallen tree that overlaps and so can be recorded on the bank top, bank face and river bed.

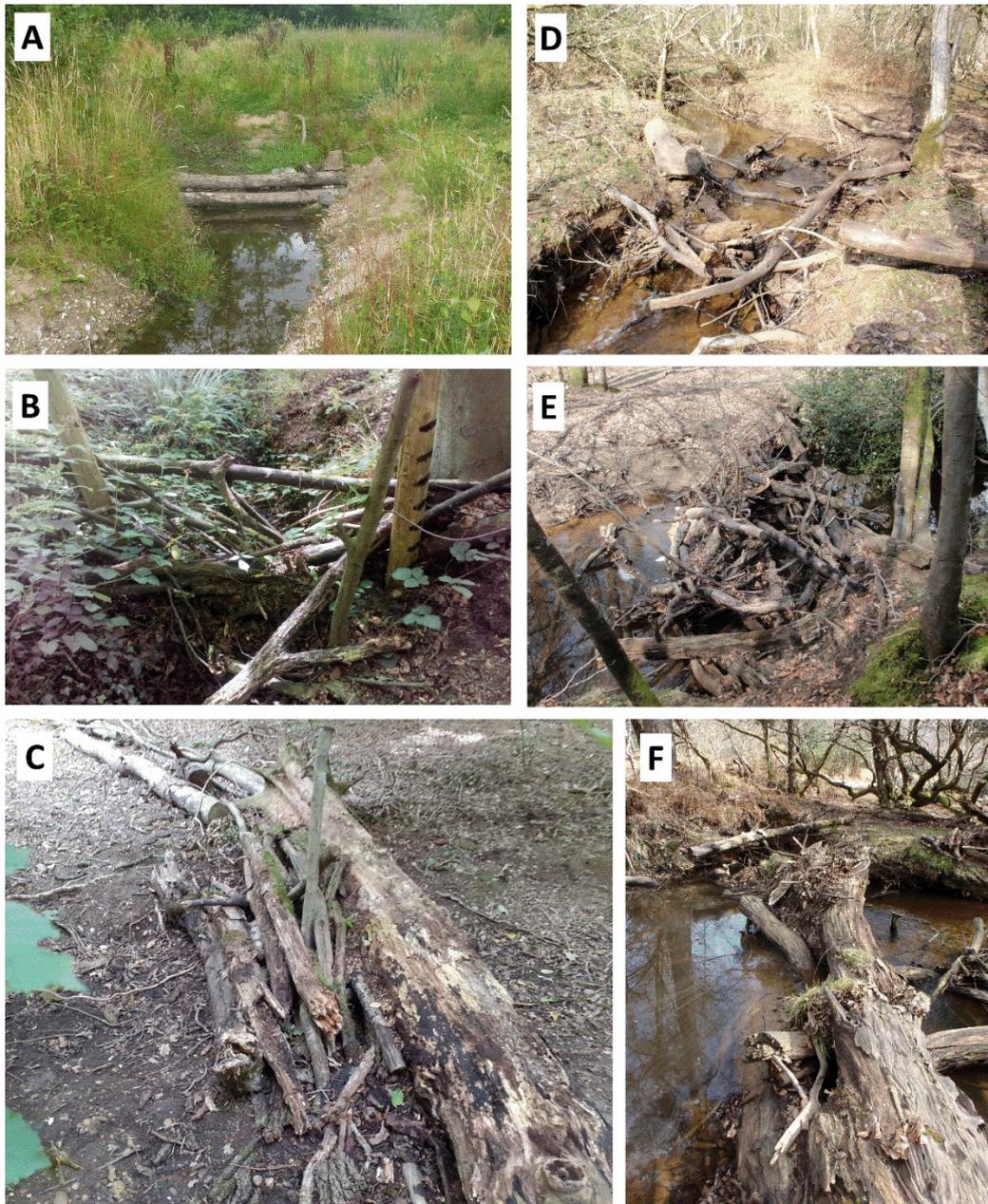


Figure 1. A, B and C are artificial features that extend across the entire channel bed and should be recorded as intermediate weirs. D, E and F are naturally-formed wood features that extend across the entire river bed and should be recorded as wood dams. In all cases the large wood pieces that form the structures should be recorded as large wood on the river bed, bank faces or bank top, as appropriate.

Deflectors or simply large wood?

Figure 2E illustrates a river channel with naturally deposited large wood (including some fallen trees) on the banks, bank faces and channel bed. All should be incorporated into the large wood estimates for the bank tops, faces and bed and any fallen trees should also be recorded separately according to their presence on the bank tops, faces and bed. The remaining images (A to D) in Figure 2 show deflectors constructed from wood. Although for clarity these images show emplaced wood that appears partly above the water surface, similar features that remain submerged at low flow should also be recorded as deflectors. The deflectors in A and B are single unbranched logs held in place by several pairs of wooden pins that have been driven into the river bed. These structures are clearly artificial deflectors, although the natural wood they contain can count as part of the large wood on the river bed. The structures in C and D look more natural than those in A and B, but on close inspection, they are also anchored to wooden stakes that have been driven into the river bed. The structures in C are simple deflectors with either a bundle of large wood pieces or a single large log (actually a tree trunk) forming the core of the deflector. In time, these structures are likely to evolve into more natural-looking features as they accumulate more wood and sediment and gradually settle into the bed and bank so that the stabilising elements can no longer be seen. They may also evolve into landforms such as vegetated side bars. At these points, the wood that remains visible will simply form part of the large wood recorded on the bed and bank face and any landform that has developed can also be recorded as the relevant bank face-channel edge feature. In D, there is a long curved deflector made up of numerous large wood pieces of many different sizes and held in place by wooden pins. In this state the structure should be recorded as a deflector and also as part of the large wood found on the bed and banks, but in time accumulation of wood and sediment, decay of the emplaced wood and the burial / displacement of the stabilising pins is likely to result in an apparently natural side bar / berm / bench feature and should be recorded as such.

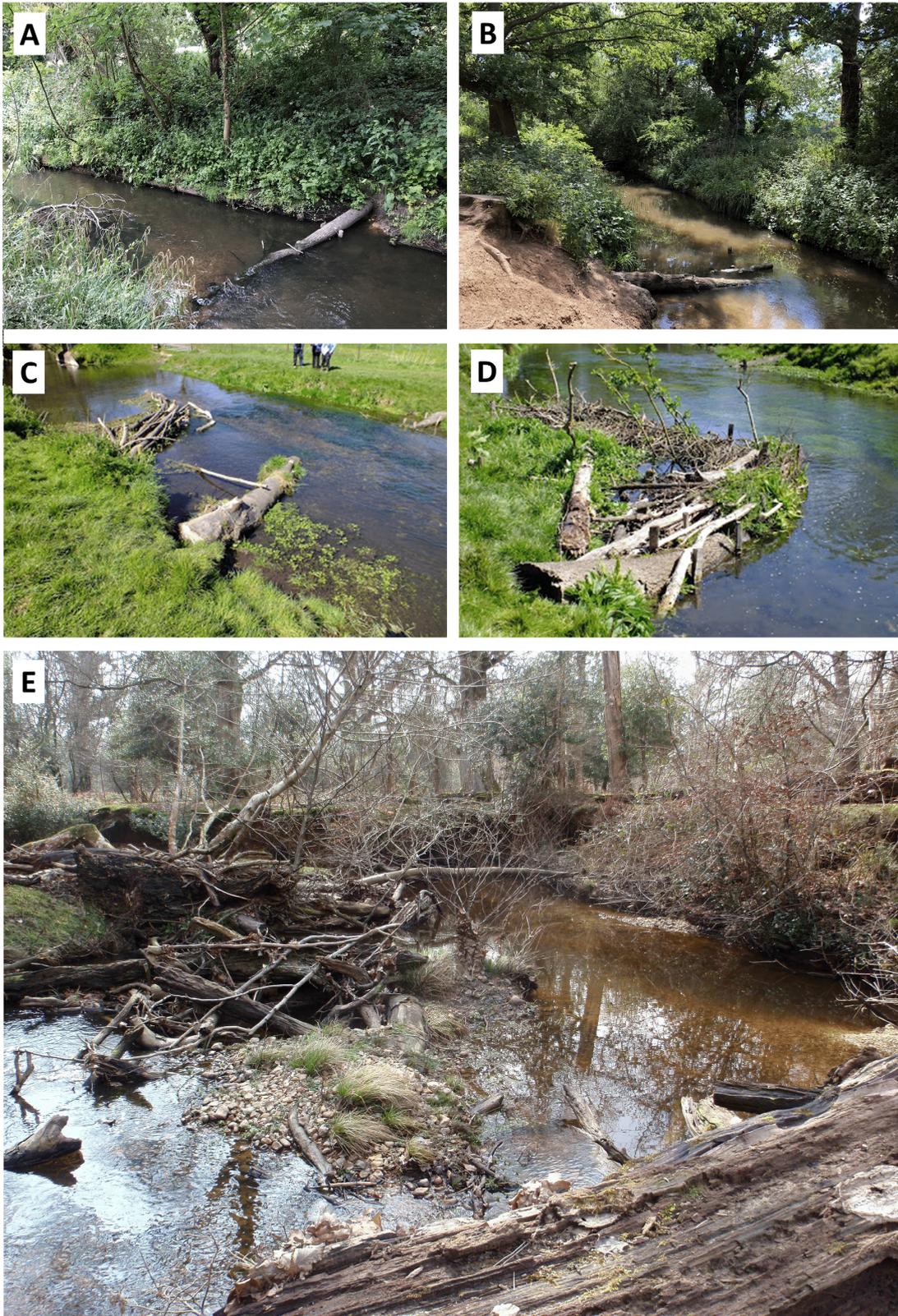


Figure 2. A, B, C and D show artificial features that extend part of the way across the channel bed and should be recorded as deflectors while also incorporating the wood into large wood estimates for the bank faces and channel bed, as appropriate. E shows naturally-deposited wood on the bank top, bank face and river bed, which should be recorded as part of the large wood in these locations. In some case the large wood is a fallen tree and so should also be recorded as such.