Biodiversity metric 3 case study 3: River restoration

This case study demonstrates how biodiversity metric 3 can be used to calculate changes in biodiversity units associated with a river restoration scheme.

Overview

This case study is based on a river restoration scheme undertaken in London. The river and associated river corridor habitat are enhanced. This results in a loss of grassland habitat area and a gain in the length and condition of river habitat but achieves a net gain in both through enhancing some of the remaining grassland habitat.

This case study demonstrates

- ✓ How the biodiversity metric 3 calculation tool can be applied to calculate changes in river biodiversity units (linear) and area habitat biodiversity units.

- ✓ Accounting for increases in the length of river channel resulting from river restoration, for example by reinstating meanders.

- ✓ Accounting for losses of area habitat biodiversity units resulting when river habitats are created or restored.

The site

This river restoration scheme was part of the wider renovation of a large London park, within a highly urbanised residential area. The scheme has multiple benefits for improving flood storage, biodiversity and adaptation to climate change within an urban environment.

The works included removing concrete structures along the watercourse, creating a natural riverbed, restoring a more sinuous river channel through existing grassland habitat, and creating an area of wet grassland habitat along the route of the original river channel by enhancing some of the existing grassland habitat.

Approach to biodiversity net gain assessment

The biodiversity metric 3 calculation tool converts river habitat type, length, condition, and strategic significance into river biodiversity units (RBUs). These RBUs are used to quantify losses and gains of rivers and streams habitats within biodiversity metric 3 in the same way as for area habitats.

Assumptions and limitations

Within this case study it is assumed that:

- River habitats are of high strategic significance, as they are part of local nature recovery scheme.
- There is major in-watercourse encroachment along a 0.1km reach.
- There is no encroachment into the riparian zone in both pre- and post-intervention.

Baseline biodiversity units

At baseline the project boundary contained 0.5km of 'other rivers and streams' habitat in 'fairly poor' condition, 0.1km of 'other rivers and streams' habitat in 'poor' condition and 2.71ha of modified grassland in 'poor' condition.

Using biodiversity metric 3 the baseline was calculated to yield 5.42 area habitat biodiversity units (AHBUs) and 5.52 river biodiversity units (RBUs) (see Table 1). This baseline represents the 'reference scenario' against which losses and gains will be measured.

Table 1. Number of biodiversity units for area and river habitats within the Site at baseline. Data extracted from Biodiversity metric 3 calculation tool.

Habitat type	Area (ha) / length (Km)	Habitat Distinctiveness	Habitat Condition	Strategic Significance	Baseline biodiversity units
Modified grassland	2.71	Low	Poor	Low	5.42
			Total habitat units (AHBUs)		**5.42**
Other Rivers and Streams	0.5	High	Fairly poor	High	5.18
Other rivers and streams	0.1	High	Poor (with 'Major' in-watercourse encroachment)	High	0.35
			Total river units (RBUs)		**5.52**

Post-development biodiversity units

Area habitat biodiversity units and river biodiversity units are considered separately within the biodiversity metric 3 calculation tool and cannot be summed, traded or converted. The restoration of a meandering river channel increases the length of rivers and streams habitat, this impacts on the surrounding area habitats. Within biodiversity metric 3 this scenario should be approached as follows:

River biodiversity unit (RBU) calculation: Following restoration, the total length of the river habitat is increased by 0.2km (to 0.8km) because of the sinuous shape of the restored channel.

This additional 0.2km of river habitat can be entered in the metric as enhancement by recording the post-restoration length in the 'length enhanced' column (column U) in the 'River baseline' sheet. This is then automatically carried forward to the 'River enhancement' sheet. A 'check lengths' warning message will be generated, and the assessor comments should be used to explain why the baseline and post-development lengths are not the same (see Figure 1).

Figure 1: How to record an increase in the length of river channel resulting from river restoration in biodiversity metric 3

The enhancement of 0.1km of 'other rivers and streams' habitat from 'fairly poor' condition to 0.2km in 'moderate' condition yields 2.50 RBUs. Similarly, enhancement of 0.1km of other rivers and streams habitat in 'poor' condition to 0.2km of 'other rivers and streams' habitat in 'moderate' condition, and with the major encroachment removed, yields 1.89 RBUs. The retention of 0.4km of 'other rivers and streams' habitat (in 'fairly poor' condition) yields 4.14 RBUs. This gives a total value for enhanced and retained river habitats of 8.53 RBUs.

Overall, the river restoration will result in a net gain of 3.01 RBUs or 54.59%. Losses and gains of units are summarised in Table 2.

Area habitat biodiversity unit (ABHU) calculation: Creation of the new river channel results in the loss of 0.37ha of modified grassland habitat (0.74 AHBUs). This loss is mitigated through the enhancement of 0.22ha of the remaining modified grassland to wet grassland habitat (classified as 'other neutral grassland' in UKHab) in good condition, which yields an additional 1.73 AHBUs. The remaining 2.12ha of modified grassland habitat is retained (4.24 AHBUs), giving an overall net gain of 0.55 AHBUs or 10.13%, despite the associated loss in grassland area.

Table 2. Losses and gains of biodiversity units. Data extracted from Biodiversity metric 3 calculation tool.

Biodiversity unit type	Description	Losses and gains of biodiversity units
Area habitat	Baseline biodiversity units (2.71 ha Modified Grassland)	+5.42
Area habitat	Net on-site retention and enhancement of habitats - 2.12ha Modified grassland retained - 0.22ha Modified grassland enhanced to wet grassland (other neutral grassland)	+5.97
	Total net gain in area habitat biodiversity units	**+0.55**
River	Baseline biodiversity units (Other rivers and streams habitat (0.5km Fairly poor, 0.1km Poor))	+5.52
River	Retained habitats (0.4km Other rivers and streams)	+4.14
River	Habitat enhancement - 0.1km 'other rivers and streams' habitat in fairly poor condition to 0.2km other rivers and streams in moderate condition - 0.1km 'other rivers and streams' habitat in poor condition to 0.2km other rivers and streams in moderate condition and removal of the major in watercourse encroachment	+2.50 +1.89
	Total net gain in river biodiversity units	**+3.01**

Area habitat	**Overall % net gain**	**+10.13%**
River	**Overall % net gain**	**+54.59%**

Conclusions

This case study demonstrates how biodiversity metric 3 can be used in river restoration projects to recognise the additional biodiversity value resulting from an increase in the length of river habitat, as well as an improvement in condition, when a river or stream is restored to a more sinuous channel.

When undertaking river restoration, consideration also needs to be given to changes in area habitats. Where restored channels result in a loss of area habitats these can be addressed through enhancement of remaining area habitats.

In this case study, a net gain in both river biodiversity units (RBUs) and area habitat biodiversity units (AHBUs) will be delivered, despite the loss of a small amount of area habitat.

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Key messages / top tips

- Terrestrial habitats and river habitats should be treated separately in biodiversity metric 3. Area habitats, measured in hectares, generate area habitat biodiversity units (AHBUs) and the river habitats, measured in kilometres, generate river biodiversity units (RBUs). These units are unique and cannot be summed, traded, or converted.
- Consider enhancing area habitats to replace the losses in AHBUs resulting from restoring the river channels.
- Removal of artificial structures encroaching either into the channel or the riparian zone can be recorded withing the metric and generate additional RBUs.

Acknowledgements

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