Westcountry Rivers Trust

Yarty: River and Floodplain Restoration - Macrophyte Translocation Proposal

Katy Day

Westcountry Rivers Trust is an environmental charity established in 1995 to restore, protect and improve the rivers, streams, and water environments in the region for the benefit of wildlife and people.

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Executive Summary

The River Yarty is a special river, which retains some valuable riverine ecology, and provides a crucial role in providing resilience to the River Axe SSSI and SAC. Its complex geology, rich landscape and mixed valley floor land use, means that location specific actions are needed to preserve and enhance the ecology whilst respecting and supporting communities and cultural assets.

The impact of channel change on the aquatic vegetation community, and the apparent deteriorating condition of this in the downstream Axe SAC, means that priority should be given to preservation and enhancement of this part of the ecosystem. Aquatic vegetation is itself a crucial habitat for much of the invertebrate and fish species in the river.

Westcountry Rivers Trust (WRT) have been working with Blackdown Hills National Landscape and the landowners to restore the river and its floodplain. In 2024 habitat restoration works were carried out at Yarty Farm. This involved the reinforcement of riverbanks and the augmentation of gravels to the river bed. Further such works are proposed elsewhere on the river.

As a result of the previous erosion and the works, macrophyte beds at the site are fragmented. WRT proposes to transplant a small quantity of *Ranunculus sp* from an existing bed to a macrophyte-free **5m x 5m area** downstream. Progress of this translocation will be monitored.

The purpose of this trial is to establish a methodology for translocation suitable for this river type and ultimately to increase local macrophyte stocks. This will then be included in the implementation approach for all further restoration works on the River Yarty.

Should this trial be successful, a second phase of the project would be proposed. In this phase, macrophytes which are currently at risk in the River Axe due to the degradation of the river's gravel beds, may be temporarily transplanted, or cultivated through cuttings at a nursery site on the River Yarty.

Following restoration work on the Axe and the rehabilitation of appropriate substrates, these plants would be restored to their original location and their genetic stock maintained. This would both support the resilience of the River Axe SAC but also increase the species abundance on the Yarty.

Contents

1. Introduction

The River Yarty flows into the River Axe upstream of the River Axe Special Area of Conservation (SAC) that is failing its conservation objectives primarily due to excessive phosphate and geomorphological reasons. The River Yarty and its ecology is similarly under pressure, which also results in erosion impacts for landowners.

The Blackdown Hills National Landscape have commissioned a River Restoration and Floodplain reconnection study to take a holistic view at restoration of the Yarty, inclusive of all river users and riparian owners, to protect property and infrastructure and justify expenditure to funders (existing and potential).

This builds on the previous studies:

- River Yarty delivery project September 2024 – with initial works at Cuckford Farm through to Yarty Bridge
- 'River Yarty Design Plan' August 2024 – by Julian Payne (Environment Agency) for Yarty Farm.
- 'River Yarty Feasibility Study' (March 2023, Westcountry Rivers Trust- WRT), covering Yarty Farm and Waterhouse Farm.
- 'Yarty Farm and Waterhouse Farm Geomorphology Advice Note' November 2022 by Julian Payne (Environment Agency)

The Blackdown Hills National Landscape aims to reverse impact on the Yarty by piloting targeted nature-based solutions (NbS). These include:

- In-channel river restoration by raising/ restoring the bed of the channel and better reconnecting the watercourse to its floodplain
- Associated floodplain enhancement work including lowering any flood banks, creating scrapes, inlets, bunds and swales to temporarily hold water (and sediment) at peak flood events

These interventions are to: -

- Restore geomorphological function and 're-setting' the watercourse channel, such that it becomes less incised
- Store water on floodplains for longer, storing phosphate rich sediment on the land
- Reduce the erosive power of the watercourse and slowing the flow, especially if adjacent floodplains are 'rougher'.
- Provide enhanced habitats in-channel for fish, protected species & other taxa.
- Downstream flood risk benefits and other co-benefits
- Provide floodplain restoration opportunities

The works are to be carried out in three phases. A detailed design study of the Yarty Farm and Waterhouse Farm reach; a feasibility of the wider river from the A30 to Yarty Farm, with an additional section upstream of the A303; and a stakeholder engagement event.

As part of both the detailed design and feasibility studies it has been recognised that for the full restoration of the River Yarty ecology an approach needs to be developed for ensuring the restoration of the macrophyte community in line with the range of species found on the downstream River Axe SAC.

This supplementary report includes a review of macrophyte translocation practice, a proposal for an initial trial translocation, and consideration for longer term translocation including the sourcing of the full plant species range from the downstream River Axe.

2. River Yarty Description

The River Yarty is the largest tributary of the River Axe. Whilst it lays outside of the Special Area of Conservation and Site of Special Scientific Interest sites of the River Axe, it is nonetheless crucial for providing resilience to these nationally and internationally important areas.

The Axe is designated for a river geomorphology that supports a rich aquatic ecosystem. The same species should be flourishing in the Yarty. These include: Short-leaved Water-starwort, a nationally scarce species, and stream and river water-crowfoot (*Ranunculus)*; Atlantic Salmon, Bullhead, Brook and Sea Lamprey, as well as both Sea and Brown Trout; a wide variety of habitats for invertebrates including several scarce dragonflies and damselflies, caddis flies, flies and true bugs; Kingfishers, Sedge Warblers, Reed Buntings, Grey Wagtails and Sand Martins; as well as Otters. Water voles might also have been present in the past.

As well as its critical role for the Axe in terms of providing supporting habitat and populations for these aquatic species, the Yarty is also significant in delivering large quantities or cobbles and gravels to the Axe. Without the Yarty, the Axe is extremely limited in availability of the larger stone due to the different geological layers in the upper Axe.

Whilst the Yarty appears to include a fairly limited range of macrophytes in the main channel, and that the locations where these remains are quite isolated, where conditions are stable it does nonetheless support thriving beds.

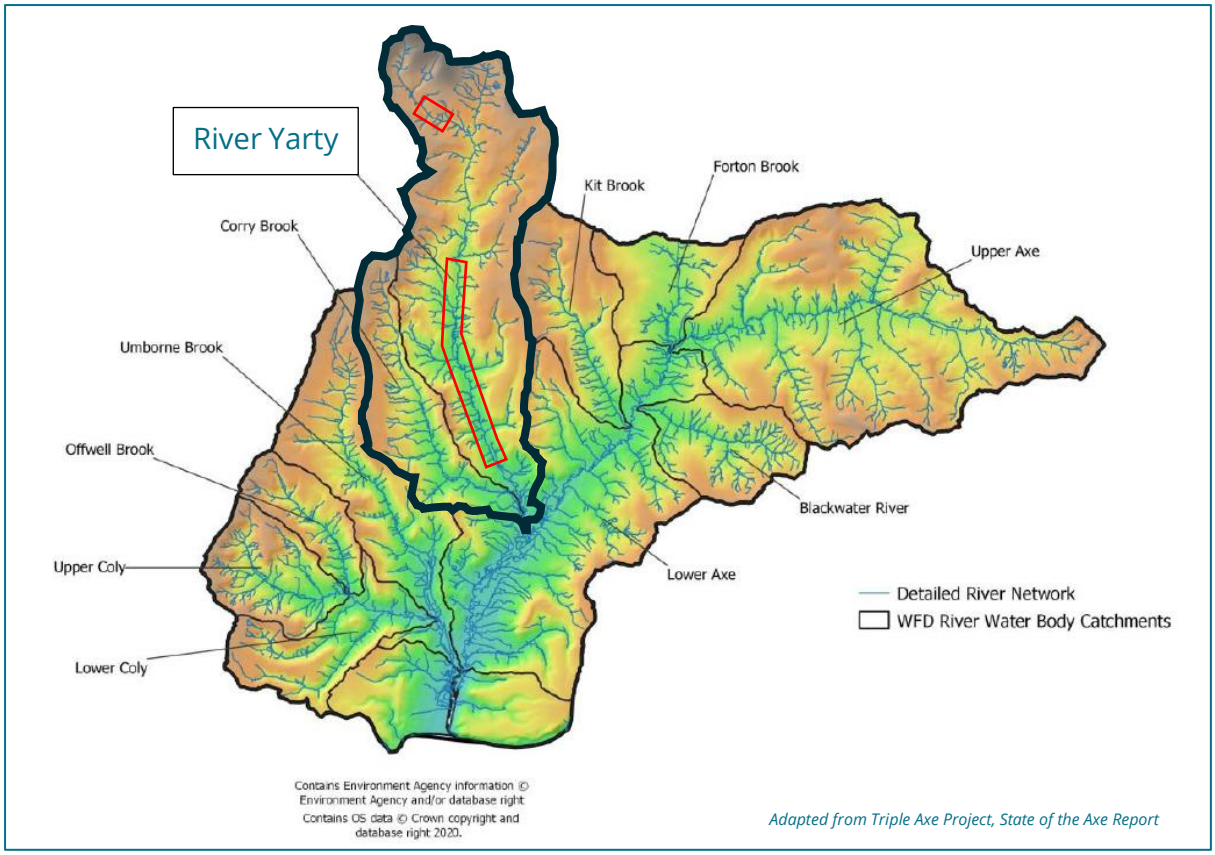

Figure 1: The River Yarty within the overall River Axe catchment, with project area in red

3. Floating Vegetation Relocation Trial

3.1 Justification

Macrophytes structure freshwater ecosystems through their influence on physical characteristics (Riis *et al.*, 2008, p.935; Marsh, 2022, p.1862). Their complexity within the water column can alter flow dynamics, sediment transport and channel depth, and provides refuge and food for species at multiple trophic levels (2022, p.1870).

Aquatic plant species often require specific conditions in which to thrive. Throughout the system, including on the main River Axe, *Ranunculus* beds are depleting.

Without an ample macrophyte source upstream from which to shed seeds or plant fragments, and without a site complex enough to receive these, the natural recolonisation of species may be a lengthy process (Riis *et al.*, 2008, p.936). Transplanting can therefore be an important tool for use following the physical and chemical restoration of degraded areas (2008, p.936).

WRT seeks to develop a method of translocating macrophytes within the context of the Yarty River and Floodplain Restoration Project and to gather further evidence on the success of *Ranunculus* transplantation.

A site at Yarty Farm suitable for translocation has been identified (see Figures 3 and 4).

In a study, Riis *et al.* identified three basic physical conditions required for sustainable macrophyte growth: shallow water (<1m depth), velocity during plant establishment (\0.4m s-1), and unshaded conditions (2008: p.940).

Although the Yarty is a relatively fast and mobile river, the selected stretch has a shallow, stable substrate in an unshaded situation. The presence of *Ranunculus* beds here indicates the suitability of the site and adequate conditions for growth. Moreover, the proximity of the donor site to the transplanting location is highly favourable (2008, p.941), being immediately upstream. This removes the risk of cross-system biosecurity hazards and reduces time required between specimen collection and transplanting.

3.2 Proposed Transplanting Method

WRT's proposed method of transplanting has been adapted from the SPRITE method (Gaskell, 2014), and from Marsh's experiments and correspondence (2021; 2022; 2025). However, the river type of the Yarty is distinct from those which have been researched (the upland River Don and the Frome, a chalk stream). Therefore, in-field methodology will be pragmatic. WRT hopes to establish a robust transplanting method based on conditions specific to the Yarty.

1. **Time of year:** work to be carried out in spring (March – May/June), prior to the main growing season (Pond Conservation and World of Water, 2011, p.16; Marsh, 2022, p.3; Wild Trout Trust, no date, p.6). Transplant during average flow conditions to reduce risk of washout.

2. **Extraction:** carefully dig plants from existing *Ranunculus* bed to extract root system. Collect in bucket, keep wet and replant as soon as reasonably practicable. Quantity of *Ranunculus* to be extracted will be dependent on bed abundance at time of work. To maintain the viability of existing beds, a cautious approach would ensure that no more than 25% of the existing bed is removed (Sayer *et al*., 2023, p.41).

3. **Preparation:** cut strips of hessian ca. 40cm x 60cm. Separate individual plants and insert one into half drainpipe ca. 25cm in length (this will prevent root damage). Cover roots with sand, stone and soil aggregate taken from the bed where possible. Wrap pipe in hessian and tie loosely with hemp string (see Figure 2). Slide pipe from bottom, fold over loose hessian and secure string as required. Repeat for each individual plant.

4. **Location:** Locate 5m x 5m area downstream of existing *Ranunculus* bed, with adequate gravel substrate and water depth ideally 25-35cm (Marsh, 2025).

5. **Planting:** Dig into substrate where possible. Add one plant parcel and secure into place using larger rocks. Ideally plant using random spacing to mimic natural distribution (Marsh, 2021, p.7).

6. **Density:** Depending on the quantity of plants available for translocation, aim to achieve ca. 30 – 40% cover in target location. This is classified as 'medium' cover in Marsh's study, where high cover >60% and low cover <10% (2022, p.3). The spacing and quantity of plants will be adjusted based on the abundance of plants available for translocation. A precautionary approach will be followed, as described above. Figures 6 and 7 below demonstrate 40% planting density within 5m x 5m area. 55 plants are represented using a spacing of 0.5m between plants. Plants to be distributed randomly across 25m^2 to mimic natural distribution (as Figure 7).

Figure 1: Screenshot from video showing SPRITE planting preparation (Gaskell, 2014)

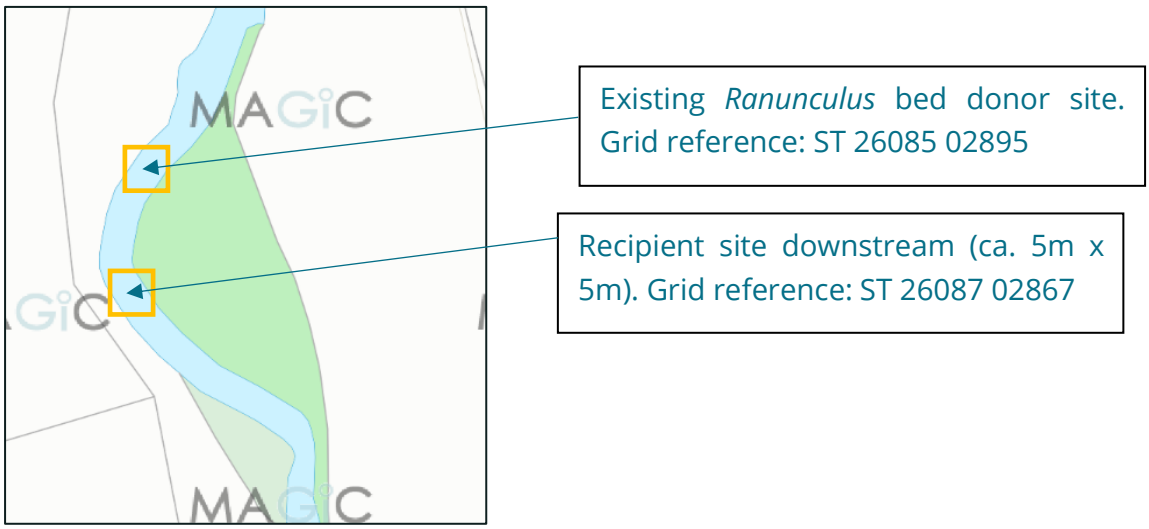

Figure 2: Locations of donor and recipient sites

Figure 3 Photograph showing donor and recipient sites

Figure 4 Photograph of recipient site

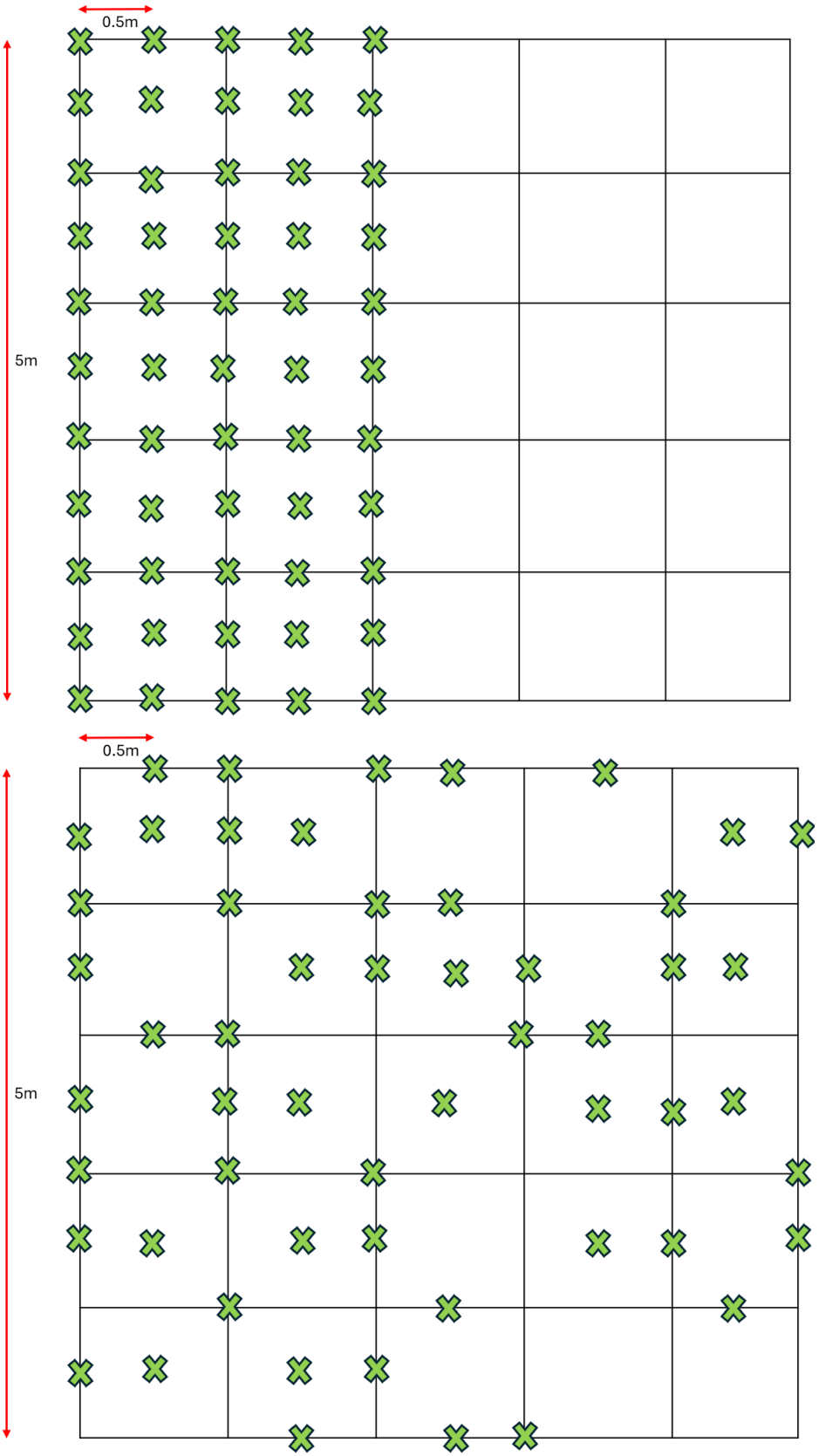

Figure 5 and Figure 6: Planting density and spacing

Figure 7 Example of Marsh's 'high cover' density planting (2025)

3.3 Concurrent Second Trial

If funding allows, the above method will be carried out simultaneously in a deeper, more incised section of channel along this stretch of the Yarty, using a proximate donor site. Progress could then be directly compared between the two planting depths, to inform depth preference for any future transplanting.

3.4 Monitoring

Three monitoring visits should be carried out over the 2025 growing season, with an additional visit in winter. Two further monitoring visits to be scheduled in spring 2026.

For each visit, monitoring will: -

- Count the number of individual stands present and compare with initial planting.
- Notes to be taken regarding river conditions, plant health and growth.
- Photographs to be taken for visual comparison.

3.5 Future Trial Methods

Propagation in trays:

1. Cuttings may be taken in spring (Riis *et al.,* 2008, p.937), summer, or after flowering (Toogood, 1999, p.168).

2. Select a healthy, non-flowering shoot from this season's growth. Cut just below a node, up to 25cm from the shoot tip (1999, p.154; 2008, p.938). Cuttings with an apical tip present may experience more vigorous growth (2008, p.941). Trim off lower leaves and keep moist. These cuttings may be kept single or tied into bunches of ca. 6 shoots (1999, p.171).
3. Allow to root in semi-submerged trays along stream banks at depths of 0.25 – 0.40cm, for six weeks prior to transplanting (2008, p.938). Trays to be filled with sand/gravel/soil sediments taken from the channel where possible. Although the rivers used in Riis *et al.*'s research were slower than the River Yarty, an appropriate location for the semi-submerged propagation trays may be found at Yarty Farm, such as a wet, but not frequently inundated area of the floodplain.
4. Once established, tray contents to be dug into a pit in the channel bed and secured with sediments/gravels. If digging is not possible, the SPRITE method, as detailed above, may be used to prevent root damage.

This method may positively impact plant success by ensuring that root networks are well established prior to replanting. Moreover, a broad range of species may be transplanted via this method. This was shown to be successful in Riis *et al.*'s study when propagating *Ranunculus, Potamogeton, Callitriche and Myriopholium* (2008). Riis *et al.*'s study stressed the importance of ensuring that river conditions are appropriate for each species (2008, p.940).

Taking cuttings has the additional benefit of ensuring that entire plants are not removed from existing beds. Cutting may even encourage growth in the donor plant, if carried out before or during flowering (Environment Agency, 2022).

Figure 8 Example of propagation tray (Riis et al., 2008, p.937)

'Snowshoe' propagation method: Further consideration may be made for a trial of the 'snowshoe' method described by the Wild Trout Trust (no date, p. 5), wherein willow-woven domes are secured into the channel. Where there are sufficient donor plants upstream, it is expected that loose plant fragments will catch in these structures, take root and grow. A rough, complex bed is the ideal substrate for macrophyte retention (Riis *et al.*, 2008, p.936), and this may be fostered through the presence of diverse gravels, woody material or aquatic plants.

Figure 9 Wild Trout Trust's snowshoe preparation (no date, p. 5)

Seed collection: The harvesting and sowing of macrophyte seeds has not been proposed within this trial, due to the additional husbandry and time required to ensure successful germination and growth. Within the timeframe of this project, plants grown from seed would be smaller than specimens propagated either through cuttings, or through the translocation of whole plants.

3.6 Costs

Current estimated costs to the client for the project, excluding VAT are: £11,909.00.

Title:	**Yarty Macrophyte Transplanting**
Key Tasks	
• 2 days' transplanting work	
• Monitoring visits	
• Management and finance time	
• Site visits, proposals, consenting and report writing	
Total charge (ex VAT)	£12,000.00

3.7 Second Phase

The lower Axe is designated a Special Area of Conservation (SAC). The geolmorphology of the site and its historically stable cobble gravel bed facilitates the presence of Annex I habitat H3260 (water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation) (Wood, Wake and McKendrick-Smith 2024, p.5). The site is also designated for the presence of brook lamprey, sea lamprey and bullhead.

The current status of this SAC is 'unfavourable declining' (Natural England, no date A). SAC documentation indicates that management should maintain this habitat at or restore it to 'favourable conservation status' (Natural England, 2018, p.1), and that there is 'no measurable reduction' in its extent (Natural England, 2022, p.6). Where necessary, the 'full extent' of this feature may need to be restored (2022, p.6). These management objectives provide impetus to act to halt the ongoing decline of this habitat and the conditions and processes that underpin it.

During WRT site visits carried out in February 2025, erosion of the gravel beds on the Axe was evident. In multiple locations the bed has destabilised and given way to deep, gravel-less pools, taking with it the ability to support the macrophyte communities for which the area is designated. The degradation in habitat suitable for these aquatic plants is linked to the finite nature of the Axe's coarse bed material, and an increase in mobility of the channel.

If the trial at Yarty Farm proves to be a successful, WRT recommends translocating macrophytes of multiple species from the River Axe to the Yarty. Here plants may be grown, or cuttings propagated, in stable conditions, prior to being returned to the Axe following habitat restoration. The aquatic species and their genetic character, which are currently at risk through degradation of the Axe, may be conserved through this proposal.

A long-term plan combining translocation and habitat restoration would assist in securing the aquatic species' resilience, while providing a more favourable habitat condition at the donor site.

All relevant permissions and consents must be sought and adhered to as part of this process. WRT is currently consulting with Natural England regarding the feasibility, opportunities and constraints of this proposal.

4. Permissions and constraints

4.1 Review of permissions

Following discussions with Natural England, work to translocate macrophytes within one stretch of the Yarty, as detailed within this proposal, would not require consent, as the site is located outside an area of statutory designation.

A FRAP may be required for a second phase of work including translocation between the Axe (SSSI and SAC) and the Yarty. This requirement will be discussed with the Environment Agency at an early stage. However, proposed works will not impact flood risk or reduce stability of the channel. It is hoped that a potential FRAP and its HRA would be supported, as the nature of the work would promote the recovery of the SAC to a favourable condition.

This potential future translocation work between the Axe and the Yarty would require permitting by Natural England due to the 'removal or cutting of any plant' from within the SSSI (Natural England, no date B, p.1). This activity would be subject to an HRA.

During discussions, Natural England emphasised that any impact on the functional linkage of the Yarty to the SAC would need to be assessed. It is pointed out that if transplanting work were to stabilise bed material on the Yarty, then there may be a positive impact on the Axe, which would be considered. An HRA must establish that the proposed work is expected to have a positive benefit to the River Axe.

During discussions, it was further highlighted that the proximity of a potential nursery site for propagating specimens from the Axe should be located as close to the donor site as possible, in order that conditions and genetic stock are maintained. Natural England emphasised that a suitable location featuring a stable bed for macrophyte growth would need to be identified prior to the return of specimens to the Axe.

5. Summary

This report has sought to justify and propose a methodology for the transplantation of aquatic *Ranunculus* along the River Yarty. It has positioned this work in the broader context of watercourse restoration and macrophyte conservation. It has proposed a phased approach whereby a successful 'nursery' site may contribute to the safeguarding of at-risk aquatic plant species from the River Axe. If successful, this work would contribute to a wider range of interventions promoting the return of the SAC/SSSI to a favourable conservation status.

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