



**River South Esk  
2020 Source to Sea Challenge  
NatureScot Biodiversity Challenge Fund  
Summary**

**River South Esk Catchment Partnership  
June 2021**

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# Introduction

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The River South Esk Catchment Partnership was awarded £130k from NatureScot in the first round of the Biodiversity Challenge Fund in 2019. Project partners included the River South Esk Catchment Partnership, Esk Rivers & Fisheries Trust, Forestry & Land Scotland, Abertay University and Angus Council. The project's aim was to enable riverbank restoration and wetland habitat creation at five sites in Glen Clova and native broadleaf expansion in riparian and montane zones in Glen Doll.

Delivery has been challenging with delays owing to Covid-19, but there has been progress. Large woody debris has been incorporated into five riverbank sites in Glen Clova: these structures collect sediment, slow water down and reduce erosion. They provide shelter for adult and juvenile fish, reducing predation pressure. New habitat will also benefit mammals, birds, plants and invertebrates.

Riparian planting of native broadleaved species is complete; every action contributes to improving the health of the River South Esk in-situ and downstream. Ongoing monitoring will allow the Partnership to build up an evidence base showing the multiple benefits these small interventions can make.

# Project delivery

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Throughout the project's delivery the River South Esk Catchment Partnership led on funding, finance, communications, and wider project coordination. Specialist technical aspects were delivered by project partners.

The Esk Rivers & Fisheries Trust (ERFT) was to deliver riverbank restoration at 5 sites in the River South Esk in Glen Clova, Angus (Figures 1 & 2). Following a tender process, cbec Ltd were appointed as design consultants to identify potential locations and propose appropriate riverbank restoration methods. McGowan Ltd were appointed to install the riverbank improvements, which was undertaken in July 2020. Further work to complete the project by installing boulders as additional stabilisation to bar apex structures was undertaken in April 2021.

The five structures installed have been a success. There is evidence that the bar apex structures are encouraging natural river processes as intended, while the trees used to shore up river banks are providing excellent cover for salmonid fish, as well as reducing the rate of bank erosion at these locations.

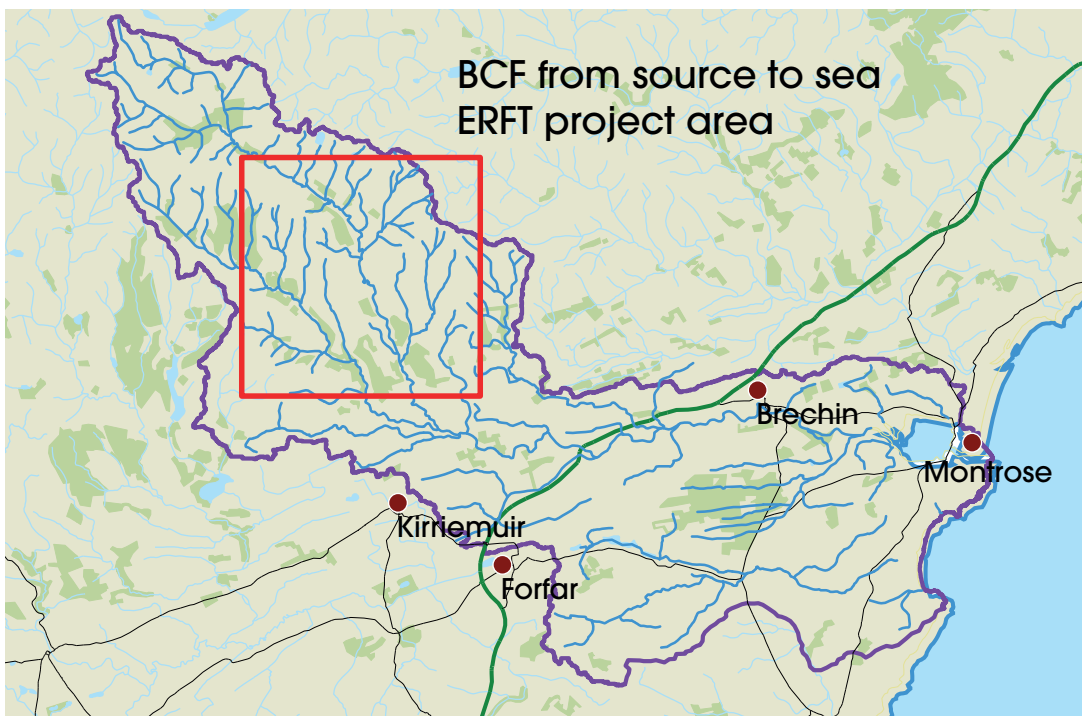


Figure 1. Map of River South Esk catchment in Angus with core project in-stream project area highlighted.

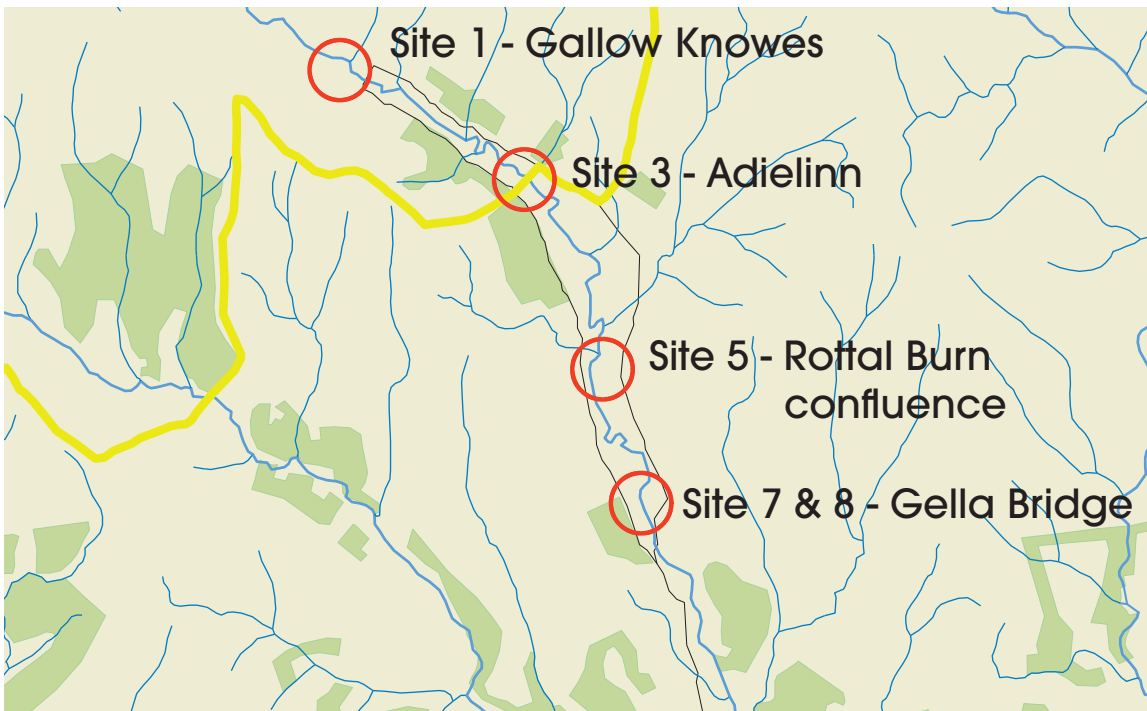


Figure 2. Detailed Glen Clova map showing the location of all five river restoration improvement locations. Works were proposed at 3 additional sites (2,4,6 - not shown) but were not selected.

Forestry and Land Scotland (FLS) delivered the planting and protection of 5,000 site native trees along the riparian zones of the River South Esk and its tributaries the White Water, the Fee Burn and Burn of Kilbo (Fig. 3). Protection is in a mixture of small fence enclosures and tree tubes. The Native trees planted along the riparian zones are shown in the table 1 below.

Table 1 – Riparian Trees planted as part of BCF '2020 Source to Sea Challenge		
Species	Number	Origin / Seed Zone
Common Alder ( <i>Alnus glutinosa</i> )	2,000	204
Silver Birch ( <i>Betula pendula</i> )	2,000	201
Aspen ( <i>Populus tremula</i> )	500	106/202 (Loch Katerine micro prop)
Hazel ( <i>Corylus avellana</i> )	250	403 Scottish Origin
Bird Cherry ( <i>Prunus padus</i> )	250	201

All trees were sourced from as local seed zone as possible or as is the case with the Hazel, grown in a seed nursery planted from seed of Scottish origin.

FLS also delivered baseline habitat survey and set up fixed point photography for future monitoring within the intended montane enclosure.

Abertay University provided support throughout project delivery in the form of evidence-based advice and practical support for delivery of riverbank restoration, habitat enhancement and the design and delivery of site monitoring. Ongoing student projects and data collection activities after the projects end will provide ongoing monitoring and engagement at no cost to the project supporting the projects legacy.

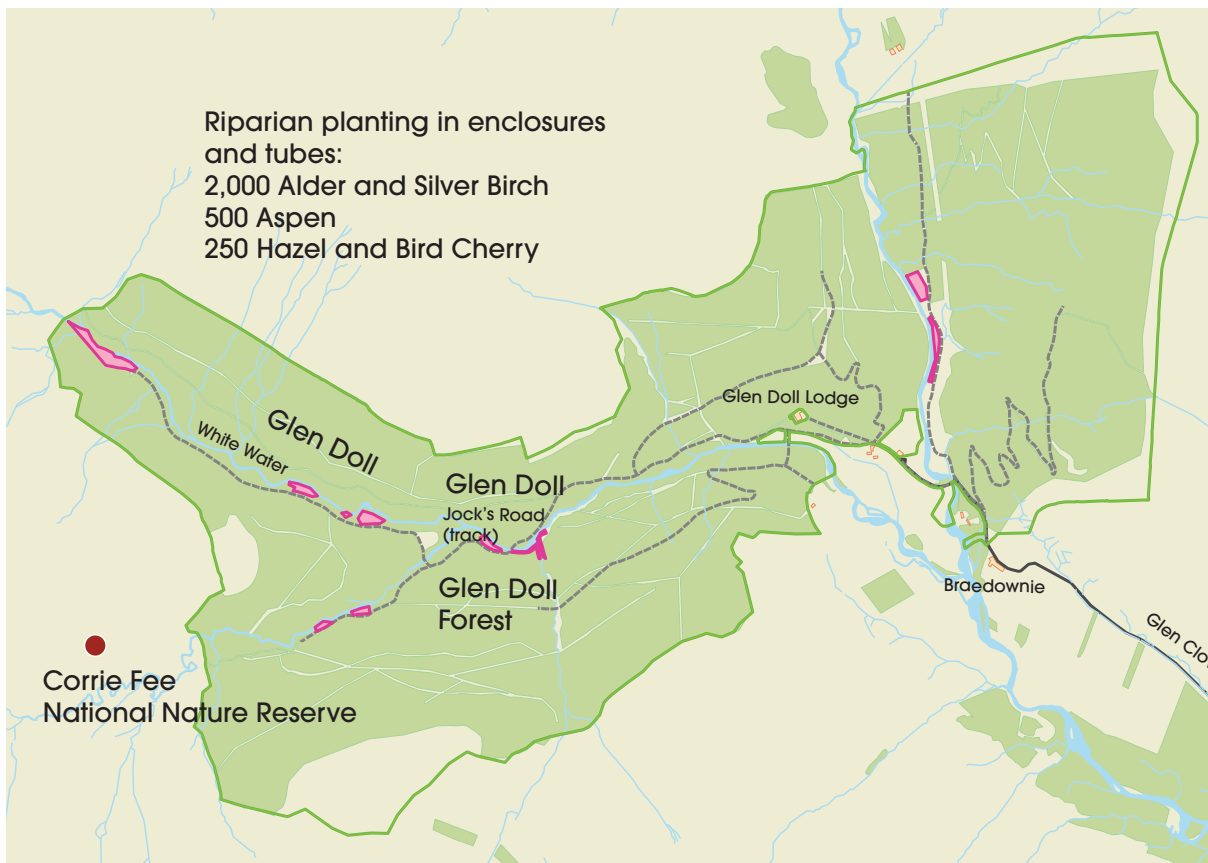


Figure 3. Map showing Glen Doll native species riparian planting areas.

# Has the project met its aims and intended outcomes?

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## Woodland expansion

The riparian planting part of the project was fully completed, with a higher proportion of trees protected by small fencing enclosures than initially planned. With the enclosures providing better protection than tree tubes it anticipated that a higher proportion of the trees will establish without any browsing pressure or the need for beating up. The establishment of at least 12 groups of riparian woodland along the watercourses providing riparian woodland habitat was achieved (Appendix 1).

In addition to the habitat creation, the project will provide discrete seed sources for future natural regeneration during forest restructuring and has increased the locally rare Aspen tree within Glen Doll Forest by approximately 490%. The additional small fencing enclosures have also protected well over 100 rowan seedling/saplings and native ground flora that have previously been subject to heavy deer browsing pressure, allowing them to fully establish and improving habitats for pollinators. The fencing enclosures provide opportunities for more native tree and shrub species, including some of the nationally rare montane willows like the Dark-leaved willow (*Salix myrsinifolia*) to regenerate away from deer browsing pressure.

The initial project outline included a high elevation enclosure to protect rare montane heath for excessive deer browsing and allow regeneration of the habitat and the few montane willows within. This part of the project was not achieved.



**5,000**  
native  
trees  
planted

## River Restoration

The project's freshwater objective was to deliver riverbank restoration and improvement at five sites in the River South Esk in Glen Clova. The aims of the project were to provide protection to the river banks, reducing the rate of erosion of fine sediments into the river, while also providing improved habitat for salmonid fish (juvenile and adult), invertebrates and freshwater pearl mussel.

These aims have been achieved. The improvements at all five sites are providing improved additional habitat for salmonid fish and invertebrates. The bar apex structures at sites 1, 3, 7 and 8 (App. 2) are all encouraging natural river processes, with new bars forming in the river leading to diversity of flows that are essential for healthy salmonid populations. The bank protection works at sites 1 and 5 (App. 2) are protecting banks from erosion, which reduces the inputs of fine sediments into the river. Additionally, these structures provide much needed cover for salmonid fish and provide substrates and food source for invertebrates.

Volunteers for ERFT have started monitoring invertebrates at the five restoration sites as well as at control sites. Initial results indicate that the number of species present is greater in and around the five restoration sites than at control sites, however these results are not scientifically robust. The Biodiversity Challenge Fund project has also prompted a program of planting native willow trees in the riparian area.



**5**  
river  
restoration  
sites



## Monitoring

Abertay University has been collecting morphological data on the Rottal Burn in the South Esk catchment for 9 years, so are very familiar with the upper catchment and the local hydrological and sediment regimes which contribute to physical habitat.

Abertay University contributed to decision-making prior to delivery of the riverbank interventions and subsequent carrying out visual monitoring of the riverbank restoration at five sites (App.3). Some monitoring visits were carried out post-installation of the bank improvements (Fig. 4) and temperature sensors were purchased to monitor temperature of the river water in relation to habitat condition.

Based on the visual monitoring, undertaken in later 2020 and early 2021 it can be seen that bar apex structures are encouraging natural river processes as intended, and that the trees used along the cut-bank of eroding river banks are providing cover for fish and reducing the rate of bank erosion at those locations.

Additionally, Abertay staff have assisted volunteers who have started monitoring invertebrates at the five restoration sites as well as at control sites. Assistance was provided with respect to introducing the volunteers to the site locations, providing fluvial process understanding and training in invertebrate sampling (App.3). Initial observations indicate that the number of species present is greater in and around the five restoration sites than at control sites, however more samples are required to determine this conclusively.

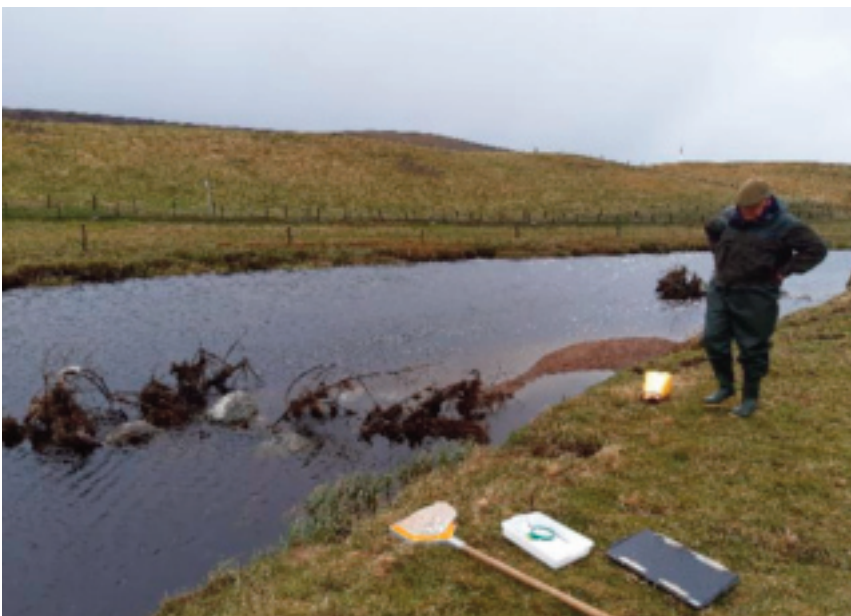


Figure 4 - Invertebrate sampling 04/05/2021 at sites 7&8 (See Fig. 2), a lamprey and several invertebrate species were recorded within the restored habitat sections. Abertay staff assisted volunteers with monitoring invertebrates at the five restoration sites as well as at control sites

# Challenges encountered and mitigation

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## Covid-19

For most partners the main challenge was the unforeseen Covid-19 pandemic lockdown and ongoing restrictions. Partners drafted risk assessments in accordance with their originations policies and worked with the contractors and stakeholders to help deliver the project as appropriate. With regards to the river restoration sites the help and support from all three landowners as well as the tenant farmer was very much appreciated. Inclusion of field-based student projects was not possible due to national restrictions and organisational protocol in relation to field activities. Public engagement and communication also stalled at this time.

## Logistics

A significant in-stream challenge was to install extra stability to the bar apex structures through boulder placement. This was initially planned for September 2020, however, could not be completed due to staff changes at the contractors. Work was then planned for early 2021, however could not be undertaken until early April 2021 due to poor weather and work commitments of the contractors.


In the upland tree planting areas of the project the main challenge was the procuring of contractors to deliver fencing of both high elevation enclosures and small riparian enclosures.

Montane enclosure - This was a small fence in the scheme of things but on a very difficult site requiring helicopter delivery of materials, with limited access for fencing contractors. The time available under the project was sufficient for FLS to have delivered the contract, which was always planned for year two.

However, environmental timing constraints due to schedule 1 raptors and climatic timing constraints due to regular winter snowfall where exacerbated by Covid-19 lockdowns. This prevented FLS from visiting the site and putting together tender documents, prevented the publishing of tender documents and prevented potential contractors from visiting the site to inform their tender submissions. This

resulted in FLS receiving no bids to complete the work. Once the initial tender failed to attract any bidders, the timescales required for tender under Procurement (Scotland) Regulations 2016 made any further procurement impossible.

Small Riparian Enclosures - Initially included in the larger montane enclosure tender, this work was of a more standard nature so could be offered as a direct call-off on the FLS fencing framework. The top two ranked contractors on the framework visited the site with the FLS but ultimately declined the contract. To solve the issue, FLS purchased all the materials for the enclosures and moved FLS squads away from other priority work to build the enclosures.



Increase in  
locally rare  
Aspen by  
**490%**

## Additional benefits and partnership working

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As with all Partnership projects, new relationships are formed, and future opportunities are identified. A new relationship with one of the project land managers, the tenant farmer, will hopefully be beneficial for future projects. It is also hoped that if the river improvements lead to improved biodiversity and an enhanced angling experience in Glen Clova, more bar apex structures may be installed in future years (Fig. 5).

Abertay University was able to engage with ERFT volunteers passing on fluvial process knowledge and invertebrate sampling methods providing new citizen science activities within the South Esk catchment. Additionally, the change of emphasis on the Abertay staff effort, necessitated by covid-19 restrictions meant that funds could be used to purchase temperature sensors. These will yield data going forward, evidencing the longer-term benefit of the new structures in providing climate resilient habitats suitable for salmonid species in the future



Figure 5. Sharing river restoration good practice in Glen Clova at with Land Owner at Rottal Estate and Cairngorms Nature.

## Plans for the 10-year compliance period

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Monitoring and will be delivered by all project partners and the ongoing ecological changes onsite will be communicated via partner channels. FLS have a detailed 10-year plan (App. 4) Any repairs to fences or tree tubes and stakes will be covered by FLS fencing and tree tube stock. Small numbers of replacement trees, if required, will be taken from larger orders of site native tree species on order

for extensive native restocking programs across the National Forests and Land in Tayside and Angus. If trees are not available from pre-ordered stock, the FLS environment budget will fund the purchase of replacement trees.

All five in-stream sites will be inspected annually by the ERFT. If maintenance is required, work with landowners will be undertaken to undertake repairs. Abertay University aim to dedicate student projects to the longer-term monitoring of the riverbank interventions.

## Project legacy - further works and new projects

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The launch of the Scottish Government's Nature Restoration Fund in Spring 2021 has provided an opportunity for the Partnership to join a bid by the Cairngorms National Park Authority to potentially deliver woodland expansion and wetland meadow creation at Adielinn in Glen Clova – one of the five in-stream sites. Currently the outcome of the bid is undetermined. Large riparian tree planting schemes ongoing in the catchment, alongside a drive to restore a network of diverse mosaic habitats – all contributing to ecological coherence and climate change adaptation. In addition, FLS continue to lead on opportunities to create seed sources for future restructuring and will create suitable native riparian zone habitat at restock following tree felling.

The new FLS land management plan for Glen Doll Forest will ensure the Biodiversity Challenge Fund's projects legacy in the forest. In the area planned for the high elevation montane enclosure, funding opportunities to deliver the project continue to be explored, and FLS have started liaison and planning seed and cutting collection of rare montane willows in the adjacent Corrie Fee NNR to create an conservation seed hedge to supply plugs for planting in and around the enclosure.

# Communications and funding acknowledgement

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The BCF grant and NatureScot have been acknowledged in all material produced for this project, including press releases, newsletter items, social media and in presentations to the Esk District Salmon Fisheries Board, Abertay University students, Cairngorms National Park Authority and Angus Council Local Elected Members. Now that the project is complete, Partners will provide details of the project on websites where possible.

Throughout the life of the project – Angus Councils' Climate Change Elected Member Officer Group has received 3 monthly updates on progress and will visit the site when the pandemic restrictions allow.

# Appendix 1

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# Appendix 2

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Before and after photos of instream sites in Glen Clova

Site 1 – Gallow Knowes



Site 3 – Adielinn





Site 5 – Rottal Burn Confluence



Sites 7 & 8 – Upstream of Gella Bridge



Photo from April 2021. Alluvial bar forming behind bar apex installed in July 2020, as intended.



# Appendix 3

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## Abertay University Site Monitoring in Glen Clova



Figures 1 & 2 – Invertebrate sampling 04/05/2021 at sites 7&8 , a lamprey and several invertebrate species were recorded within the restored habitat sections. Abertay staff assisted volunteers with monitoring invertebrates at the five restoration sites as well as at control sites.

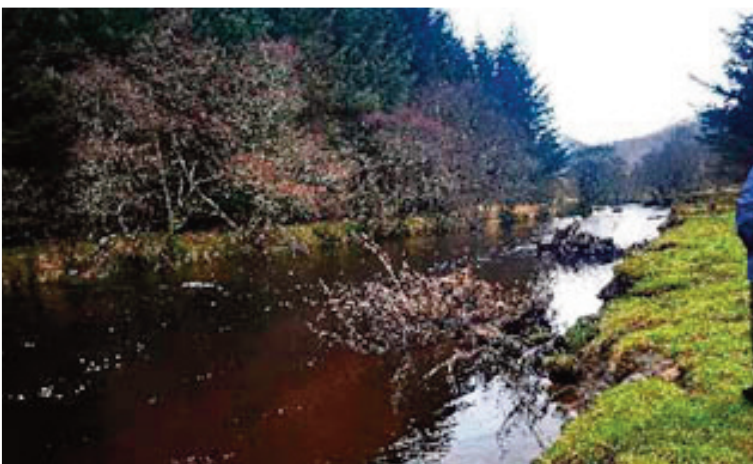


Figure 3 – The bar apex structures at sites 7 and 8 are encouraging natural river processes, with new bars forming in the river leading to diversity of flows that are essential for healthy salmonid populations.

Figure 4 – visual inspection of the riverbank restoration at site 1 with volunteers, 04/05/2021.



Figures 5 & 6 – Site 3 – visual inspection visits on 7th and 16th Dec 2020 with ERFT and the contractor.



# Appendix 4

## Forestry & Land Scotland 10-year maintenance Schedule

**Table 2 – 10-year Maintenance Schedule**

Year	Maintenance Planned
2021	Monitor trees in tubes and enclosures and replace any deaths. Monitor tubes and enclosures every 6 months, replace/repair as required.
2022	Monitor trees in tubes and enclosures and replace any deaths. Monitor tubes and enclosures every 6 months, replace/repair as required.
2023	Monitor trees in tubes and enclosures and replace any deaths, trees should now be over 1.8 meters tall. Monitor tubes and enclosures every 6 months, replace/repair as required.
2024	Monitor enclosures and tubes in spring / early summer. Repair as required.
2025	Monitor enclosures and tubes in spring / early summer. Repair as required. Survey for conifer regeneration in enclosures and around tree tubes. Cut and remove as appropriate.
2026	Monitor enclosures and tubes in spring / early summer. Repair as required.
2027	Monitor enclosures and tubes in spring / early summer. Repair as required.
2028	Monitor trees in tubes and enclosures to determine establishment and deer browsing pressure. If browsing above the tree tubes is prevalent, remove and replace taller tubes to allow trees to establish above browsing line. Monitor enclosures and tubes in spring / early summer. Repair as required.
2029	Monitor enclosures and tubes in spring / early summer. Repair as required.
2030	Remove tree tubes and enclosures around robust healthy trees. If some enclosures are required to be retained, continue annual inspections.



This project is supported by the NatureScot Biodiversity Challenge Fund.



Thanks to NatureScot (Core Funder), project partners and all participating landowners

Photo credits. River South Esk Catchment Partnership, Forestry and land Scotland, Esk Rivers and Fisheries Trust and Abertay University

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