Upper Spey beaver translocation - monitoring and mitigation plan

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Monitoring plan

1. Introduction

This plan covers the monitoring requirements for European Protected Sites, SSSIs and wider countryside monitoring. If the monitoring identifies a potential negative impact on a protected site or species, then the relevant authority will be informed and they will investigate and determine what, if any, mitigation is required.

These monitoring requirements were identified by the Habitats Regulations Appraisal (HRA) that was undertaken for the River Spey by NatureScot in 2023. Detailing the monitoring of protected sites and species highlighted in the HRA is a requirement of the licence application to translocate beaver to the upper Spey Catchment. Four meetings took place between NatureScot, RSPB Scotland and Cairngorms National Park Authority staff between September and November 2023 to develop the monitoring plan detailed below.

Key data on beaver distribution via field signs will inform all of the monitoring effort which is expanded on below. Monitoring of the qualifying features or protected sites need only be undertaken where beavers are present (field signs indicate presence).

2. Monitoring and reporting

- The Park Authority will endeavour to undertake weekly monitoring of the initial release sites (Rothiemurchus and Wildland Cairngorms), working with land owners and managers around these sites to gather as much data as is useful about the movements and range of the beavers.
- This will be reviewed after 6 months to determine if the frequency of monitoring should be changed.
- Regular monitoring will take place on Insh Marshes, incorporated into reserve work. Monitoring will be more intensive in the initial time period following release, becoming less frequent as ranges become more stable.
- Observations will be collated by the Park Authority on a monthly basis and shared with landowners, land managers and key contacts within the release zones and adjacent areas.
- A beaver recording App may be developed to enable all those recording beaver signs to do this as easily and quickly as possible.
- If developed, the data from the App will be validated and verified by the Mammal Society and then uploaded to the NBN at a suitable scale to preclude identifying the release sites.
- If the Cairngorm Beaver app development does not go ahead, then the Mammal Mapper App will be used.
- The Park Authority (and release site landowners/ managers) will be able to view the unverified App-gathered data "live" via a portal that Natural England have developed.
- More detailed site monitoring will be undertaken using an online form. The detail of what data to gather is being developed by a small working group but will include all the detail required by the bi-annual Formal Monitoring. The form will be trialled once beavers are released and reviewed after 6 months. The Park Authority will undertake this work. The use of the more detailed form by other organisations or individuals will be at their discretion.
- A monitoring group (made up of NatureScot, the Park Authority and RSPB plus other landowners) will meet every six months to review the data being gathered and any impacts on the protected sites that are within the beavers current range.
- Any movement of beavers into sites previously without a beaver presence that the Park Authority becomes aware of will be immediately reported to NatureScot, the landowner and land manager and then beaver activity on site will be monitored.

- Formal monitoring, as detailed by NatureScot's document "Post-release monitoring of beavers following translocation – recommended approach ((2022)", of beaver territories in the Spey catchment will take place in winter and summer. The Park Authority will undertake this monitoring outwith Insh Marshes. The RSPB will undertake this monitoring on Insh Marshes.
- The above monitoring will be undertaken for 5 years (the period of the licence) and then thoroughly reviewed, lessons learned highlighted and recommendations for future monitoring made.

3. Protected sites and species monitoring – European legislation

Table 1. European protected species and sites monitoring

Qualifying Feature	Site	Monitoring expectation	Responsible party	Priority	Mitigation needed	Action

Atlantic salmon (*Salmo salar*) **and** Otter (*Lutra lutra*)	River Spey SAC, Cairngorms SAC	Surveillance for beaver dams within the SAC and its tributaries, both within the SAC and into and out of it. If spawning burns are dammed there will be am assessment of the passability of the dams to fish this will inform the mitigation requirements	CNPA/ Spey Fishery Board (SFB)	Must	Measures to ensure that juvenile and adult Atlantic salmon can move upstream and downstream freely. Ahead of any mitigation an assessment of the beaver dams passability to fish should be made (*adapted SNIFFER Protocol, Beaver Trust that is being drafted) If dam is not likely passable by fish the mitigation measures are likely to include the partial or complete removal of beaver dams under licence. The use of flow device designs incorporating fish passes remains untested but there could be scope to study this on specific sites. Actions to mitigate any beaver activity related deterioration of spawning habitat, e.g. through sediment or gravel starvation below dams. Measures should ensure spawning areas can be recharged with new gravels from upstream.	CNPA and SFB to formalise the detail of where monitoring needs to be carried out (should beavers colonise these locations) and who will do it and agreement of what to do regarding any damming of spawning burns and how the impact of such dams could be studied
Comment	Further research to assess the actual impact of beaver dams on Atlantic salmon movement and the quality of the redds will further inform the need for, and scale of, future management interventions. Any research that is proposed on dams and fish should be passed by the Fish and Beaver sub-group in SBAG for their comment and agreement.					

	From Roger Knight, Director of the Spey Fishery Board, "I am writing to confirm that the Spey Fishery Board is content to work with and be contracted by the CNPA to investigate fish passage in the vicinity of any dams created by beavers and to review the habitat that these may create for fish populations. As you know, this research has not yet been undertaken in Scotland and we therefore hope that this work will provide valuable information and data for fisheries research with regard to beaver/salmonid interaction."					
[redacted]	[redacted]	[redacted]	CNPA	Must	[redacted]	[redacted]
Comment	[redacted]					
Clear-water lakes or lochs with aquatic vegetation and poor to moderate	Insh marshes SAC	Annual site checks to support Site Condition Monitoring, to identify impacts before they have an	RSPB and NatureScot	Must	Mitigation if deemed necessary and include the appropriate licensing and use of, for example, flow control devices to manage dams, the removal of dams etc.	Identify sites/ features and vascular plants for site check; to be adaptive to beaver presence

nutrient levels **and** Wet heathland with cross-leaved heath, Dry heaths, Blanket bog, Acid peat-stained lakes and ponds **and** Very wet mires often identified by an unstable `quaking` surface		adverse effect on site integrity Cairngorms Clear-water lochs - SCM done recently for this feature Wet heathland- any impacts likely to be very local. Very wet mires- valuable to id sites which might be affected and track what happens				RSPB and NatureScot to arrange a site visit to Insh marshes to determine what parameters the monitoring will utilise Site visit arranged for January 2024
Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels **and** Wet	Cairngorms SAC	Annual site checks to support Site Condition Monitoring, to identify impacts before they have an adverse effect on site integrity	NatureScot	Must	Mitigation if deemed necessary and include the appropriate licensing and use of, for example, flow control devices to manage dams, the removal of dams etc.	Identify sites/ features and vascular plants for site check; to be adaptive to beaver presence

heathland with cross-leaved heath, Dry heaths, Blanket bog, Acid peat-stained lakes and ponds **and** Very wet mires often identified by an unstable `quaking` surface		Cairngorms Clear-water lochs - SCM done recently for this feature Wet heathland- any impacts likely to be very local. Very wet mires- valuable to identify sites which might be affected and track what happens				
Comment	Longer intervals between formal checks could apply to areas that are more visible to casual inspection or where the habitat is considered to be remote from beaver habitat. Where it is considered remote from beaver activity the NatureScot Site Condition Monitoring and Site Check visits should suffice. An initial meeting took place between NatureScot and RSPB on the 25 of October to discuss the Insh Marshes SAC					
Native woodland features - Caledonian forest	Cairngorms SAC,	Monitoring should be carried out at the end of winter/ beginning of spring using the WHIA-lite methodology and	CNPA to co-ordinate or via land	Must	The results used to inform deer/livestock management to ensure appropriate levels of herbivore impacts are maintained where beavers are present	Further work to identify where riparian sections within SAC occur and landownership. It is likely that land managers will be

and Alder woodland on floodplains	Kinveachy forest SAC Insh marshes SAC, Lower River Spey- Spey Bay SAC	incorporating monitoring of beaver signs. This should be done through annual site checks for the first 5 years and the frequency reviewed thereafter. Lower River Spey and Spey Bay checks to include impacts on INNS- outwith CNPA hence NatureScot staff to co-ordinate	managers NatureScot NatureScot		For beavers, licenced intervention could be considered where there is serious risk of damage to a conservation interest, but proactive mitigation in the form of selective tree protection is more likely, but is unlikely to be appropriate on a large scale Lower River Spey/ Spey Bay. Consider management measures in place to control INNS	monitoring deer impacts - ideally utilise existing surveys/ data Monitoring Group meeting discuss the above points RSPB will survey the Tromie prior to any release of beavers on the reserve NatureScot will discuss INNS issues with their colleagues downstream of the Park and SISI staff
Comment	Insh – Alder woodland: This feature is on Feshie Fan and River Tromie. Feshie fan SCM and Herbivore Impact Assessment done 2023 for baseline					
Osprey nests	River Spey - Insh marshes SPA,	Identify at risk sites whilst surveying known territories annually	CNPA and RSPB	Should	Individual tree protection as appropriate	Annual record of nest sites to be checked in response to beaver presence/ risk.

	Cairngorms SPA. Abernethy Forest SPA					Liaise with the CNPA Raptor Officer to disseminate beaver distribution information to the local raptor study group and establish a line of communication in case that should be required.
Whooper swan *Cygnus cygnus* Wigeon *Anas penelope*	River Spey – Insh Marshes SPA	As per Insh Marshes SAC	RSPB	Should		Fits in with current ongoing monitoring

4. Protected sites and species monitoring – domestic legislation

Whilst not a requirement of the HRA, the inclusion of Sites of Special Scientific Interest (SSSIs) in this document made sense as many of the European protected sites and species overlap with or are found on these sites.

The list of SSSIs or their features will be assessed via Site Condition Monitoring (SCM) or site checks. Noting that the priority for undertaking these is to be informed by beaver presence. The Park Authority will notify NatureScot and the land owner/ manager of SSSIs when;

- Beavers are being released into will be part of the weekly surveys (outside of Insh Marshes)
- Beavers' presence is recorded on a SSSIs

The decision to undertake detailed monitoring on these sites lies with the NatureScot area staff and their species and habitat advisors.

Aside from biodiversity impact beavers may have an impact on the geomorphology of sites such as Feshie and Allt Mor, again this would be a case of contacting the relevant NatureScot staff once beavers are released or their presence recorded on these SSSIs.

As NatureScot area staff and the relevant species and habitat advisors have been involved in the production of this document, we envisage that this productive relationship and the good lines of communication will continue when the Monitoring Group is formally convened.

Table 2. SSSI Monitoring

Sites for which SCM/ site check monitoring proposed	Features	Comment
Abernethy Forest	Native pinewood	SCM completed 2023 SCM of woodland feature.
Alvie	Hydromorphological mire range Upland Oak woodland	See River Spey SAC monitoring. Monitor herbivore impacts. SCM of woodland and mire features.
Bochel wood	Upland Birch woodland	Monitor herbivore impacts. SCM of woodland feature
Burn of Ballintomb	Wet woodland	Monitor herbivore impacts. SCM of woodland feature

Craigellachie	Upland birch woodland	Monitor herbivore impacts. SCM of woodland feature
Craig Dhubh	Upland birch woodland	Monitor herbivore impacts. SCM of woodland feature
Creag Meagaidh	Upland birch woodland	Monitor herbivore impacts. SCM of woodland feature
Creag nan Gamhainn	Upland birch woodland	Monitor herbivore impacts. SCM of woodland feature
Fodderletter	Springs and Lowland Calcareous Grassland	Site check for damming of Allt nam Muc informed by beaver presence
Kinveachy Forest	Native pinewood	See SAC monitoring in the Table 1
Lower River Spey	Wet woodland	See SAC monitoring in the Table 1
Lower Strathavon Woodlands	Upland Birch woodland and Upland oak woodland	Monitor herbivore impacts. SCM of woodland feature
North Rothiemurchus pinewood	Native pinewood Lichen assemblage Vascular plant assemblage?	Monitor herbivore impacts. SCM of woodland feature with particular attention to impact on assemblage features.
River Spey - Insh Marshes	Vascular plant assemblage	See SAC monitoring in the table above And the River Spey - Insh Marshes SAC Beaver Monitoring Plan see Appendix 1 SCM of vascular plant interests
Spey Bay	Wet woodland	See SAC monitoring in the Table 1

	Hydromorphological mire range	SCM of woodland and mire features.
Glenmore forest	Native pinewood	Monitor herbivore impacts. SCM of woodland feature
River Spey	Salmon, [redacted] otter	See SAC monitoring in the table above

Mitigation plan

1. Introduction

This Mitigation Plan will follow the Beaver Management Protocol that NatureScot have produced but with the Park Authority adding extra resource and support to businesses, landowners and the general public ensuring that the delivery of any required mitigation happens as smoothly and quickly as possible.

Through meetings with landowners, farmers and land managers in the immediate release area and beyond, we were advised of high impact or sensitive sites that needed regular monitoring or pre-beaver release mitigation measures. These are listed in Section 4 and 7.

Taking action early or better yet taking forward pre-emptive mitigation when there is a high degree of certainty that there will be a negative impact, is the main thrust of the Park Authority's approach.

The Mitigation Plan will evolve as the beavers spread from the initial release areas. Regular monitoring of the beavers' territories and their activity will be undertaken by the Park Authority staff in conjunction Park Authority Volunteers, RSPB staff and landowners, land managers, householders and members of the public.

2. Actions to facilitate the delivery of mitigation that will be delivered by the Park Authority

The Park Authority is committed to supporting land managers in living alongside beavers. As the translocation licence applicant, we will provide additional resource and be the primary point of contact for beaver mitigation and management in the National Park. The additional support being offered to businesses, landowners and the general public within the Park includes:

- Single, named point of contact within the Park Authority, the Beaver Project Manager
- Provision of advice on beaver mitigation
- Access to additional staff and volunteers to undertake monitoring
- Regular monitoring undertaken to detect the range and spread of beavers within the National Park boundary

- Dialogue with landowners / managers, the public and the Park Authority to identify and map areas of high impact
- Continued development of the list of potentially high impact sites
- Extensive proactive monitoring will be undertaken on high impact sites when beaver presence is detected
- Landowners / managers contacted when beaver signs are detected on their land
- Quick responses to requests for site visits
- The Park Authority will offer to make, on behalf of the landowner / manager, any European Protected Species licence application that is required for mitigation works
- Additional budget provided by the Park Authority, to fund small-scale mitigation activities and remedial works not covered by the national mitigation scheme. To be agreed between the land owner / manager and the Park Authority on a case-by-case basis

Note: All mitigation licence applications must pass the three European Protected Species Licencing Tests before they can be approved

Table 1: Mitigation scenarios

Scenario	**National mitigation scheme**	**Park Authority added resource**
Individual tree protection using weldmesh	Some protection of high value trees will be supported by Mitigation Scheme. This excludes private gardens	Weldmesh provided and will be fitted by the Park Authority, if requested by the landowner, for a limited number of individual trees. Includes private gardens
Large-scale tree protection through fencing*	A limited set of circumstances where exclusion fencing is considered appropriate other than as a trial or demonstration	Support (materials and/ or funding) for the installation of large-scale fencing will only be provided in exceptional circumstances
Dam identified within two weeks of it being built	Removal at the landowner's expense	Will remove the dam if requested to do so by the landowner

Dam identified after two weeks. Landowner does want that area dammed	Licence application by the land manager to NatureScot for dam removal. At the applicant's expense	Will apply for a licence on behalf of the landowner and if successful remove the dam, if requested to do so
Dam acceptable but the extent of flooding is not	Flow devices suggested. Licence application by the land manager. Installation carried out under licence by NatureScot	Will apply for a licence on behalf of the landowner and if successful will install the flow device, if requested to do so
Collapsed burrows affecting access	Normally carried out by land manager at own expense. Viewed as repair rather than mitigation	A budget to fund some remedial works is available and this will be evaluated on a case-by-case basis
Destruction of burrow or lodge	Licence application by the land manager to NatureScot for destruction of burrow or lodge	Will apply for a licence on behalf of the landowner and if successful will seek specialist advice to deliver this
Beaver detected in high impact area	Not mapped by NatureScot	High impact sites mapped. If beavers are present close to these sites, monitoring frequency will be increased
Assessing and monitoring flood embankments	Not undertaken by Nature Scot	An initial survey of the flood banks will be completed in winter 2023/24 to provide a baseline of flood bank location and condition with periodic surveys thereafter
Impact on flood embankments	Landowner's responsibility to remediate	Grant assistance will be available for any breach in the flood banks in the National Park proven to be caused by beaver burrowing where the flood bank was

		shown previously to be in good condition. Time limited until March 2026
The above mitigation techniques are not working	Licence application by the land owner / manager for translocation If successful, NatureScot trap and re-locate	Undertake translocation licence application on behalf of land owner / manager
Translocation is unsuccessful or there is no other satisfactory solution	The land owner / manager applies for a lethal control licence If a licence is approved the landowner / manager can cull the beaver and must return the cadaver to NatureScot	Undertake lethal control licence application on behalf of land owner / manager If a licence is approved and the land owner / manager would prefer, the Park Authority will arrange and pay for trained contractors to cull the beaver and will return the cadaver to NatureScot

* Beaver specific exclusion fencing is available consisting of an upright and skirted section. This approach seeks to exclude beavers and hence its limited use is expected to protect high value public interests.

2.1 Training

Delivering training to increase the capacity locally to deliver mitigation	Work with NatureScot to deliver training courses on all aspects of mitigation
Training and assessment for activities requiring a general or specific licence	Work with NatureScot to deliver training courses with accreditation for a general licence on dam removal and more specific licencing.

3. Site visits to date

Understanding the extent of pro-active mitigation required has been determined by many site visits to those close to the initial release sites or those outwith these areas that have expressed concerns to Park Authority or project partners.

From these visits a number of high impact sites have been identified that are outwith the initial release area, see Section 4.

Table 2. Site visits

07/04/2023	Loch Insh Watersports	Businesses
11/04/2023	Various	NGO
14/04/2023	Coull Woods	Govt
28/04/2023	RSPB Insh Marshes	NGO
10/05/2023	Mill Dam, Dunkeld	NGO
24/05/2023	Alvie and Dalraddy Estates	Businesses
13/06/2023	South Clunes	Businesses
27/06/2023	Alvie and Dalraddy Estates	Businesses
12/07/2023	Easter Duthil	Farmers
13/07/2023	Anagach Woods	NGO
21/07/2023	Rothiemoon	Farmers
04/08/2023	Rothiemurchus	Businesses
04/08/2023	[redacted]	Businesses
15/08/2023	Rothiemurchus	Landowner
12/09/2023	Old Milton	Businesses
14/09/2023	Kingussie	Farmers
20/09/2023	The Dell	Kingussie Camanachd Club
27/09/2023	Balliefurth	Farmers
28/09/2023	Old Milton	Businesses
11/10/2023	Rothiemurchus	Businesses
11/10/2023	Rothiemurchus	Businesses
17/11/2023	Rothiemurchus	Businesses

Sites visits to householders near the Rothiemurchus Estate and sites within Nethybridge are planned in late November/ early December.

4. Current list of high impact sites

The criteria for assessing risk is the multiplication of the likelihood by the severity or impact. As the beavers are not currently present the risk is zero. This being the case, it was decided to use the impact as a way of determining what sites should be prioritised for monitoring should beavers start to be present, on or close to these sites.

There are generic locations that will be assumed to be at high risk until this is determined otherwise. These are:

- Garden ground close to watercourses
- Palatable trees close to watercourses in close proximity to transport infrastructure and properties
- Dammable watercourses close to properties, farmland or transport infrastructure

From these generic locations, specific sites have been brought to the Park Authority's attention. We have termed these high impact areas. A map of high impact areas will be developed in due course to make public (where possible) the location and type of sites we are monitoring.

Areas close to where beavers will be released initially will be monitored weekly by Park Authority staff. In addition, communication between the estate staff on site or property owners will be developed to allow the sharing of beaver distribution information. We expect that information on the distribution of beavers will be readily shared. It is highly unlikely that beavers will reside near a property or on farmland without the Park Authority being informed. This will allow the monitoring of high impact sites to start very soon after they are first visited by beavers.

Monitoring will determine the extent of a beaver's territory and once these boundaries settle down, the number of high-risk sites requiring monitoring will be determined. This list will be constantly updated as the beavers' territories increase in number and geographical spread.

4.1. Protected sites and species

A list of protected sites and species requiring specific monitoring has been created and agreed with NatureScot as part of the licence conditions. More detail on the specific monitoring requirements and mitigation that would be required and actions can be found in the Monitoring Plan on page 16-27 of this document.

Table 3. Protected sites and species

Qualifying Feature	**Site**
Atlantic salmon (*Salmo salar*) **and** Otter (*Lutra lutra*)	River Spey SAC, Cairngorms SAC
[redacted]	River Spey SAC
Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels **and** Wet heathland with cross-leaved heath, Dry heaths, Blanket bog, Acid peat-stained lakes and ponds **and** Very wet mires often identified by an unstable `quaking` surface	Insh marshes SAC, Cairngorms SAC
Nature woodland features - Caledonian forest **and** Alder woodland on floodplains	Cairngorms SAC, Kinveachy forest SAC; Insh marshes SAC, Lower River Spey- Spey Bay SAC
Osprey nests	River Spey - Insh marshes SPA, Cairngorms SPA. Abernethy Forest SPA
Whooper swan (*Cygnus cygnus*) Wigeon (*Anas penelope*)	River Spey – Insh Marshes SPA

4.1.1 Non-protected sites of high biodiversity value

A list of features that would be desirable to monitor arose from the discussions on protected site and species. As these sites may not be on a protected site or be a qualifying feature on a protected site, they are not required to be part of the monitoring for the licence application, However, the Park Authority has decided that it would be useful to map and monitor sites where

beaver are present or active. More detail of this is to be found in the Upper Spey Beaver Translocation Research Protocol document that has been produced.

Table 4. Features to be monitored in the wider countryside

Feature	**Location**
Herbivore impacts on riparian woodlands	Wider Countryside
Notable stands of aspen in the riparian zone	Wider Countryside
Beaver activity close to trees hosting notable lichen species and ancient trees	Wider Countryside

Table 5. High impact sites close to the initial release sites

	Impacts				
Location	Damming/ Flooding	Tree felling	Burrowing/ bank erosion	Biodiversity Impact	Gardens
Pitmain Burn/ Main Drain, Kingussie	X	X			
Gynack Burn	X	X			
Kingussie Waste Water Treatment Works	X	X			
The Dell, Kingussie Camanachd Club		X	X		
Ruthven Burn	X	X			
Allt an Torra Chruaidh (water intake for heat pump)	X				
Railway Embankment at Insh Marshes			X		
Road Culverts under the B9152 from the A9 at Kingussie to the Dunachton Burn	X				
Roadside trees along the B9152 [redacted] and from the Dunachton Burn		X			
Burn to A9/ B9152 T-junction		X			
Stand of White Poplar at the A9/ B9152 T-junction southbound		X			
Old Milton Amenity Ground	X	X	X		
Raitts Burn	X				
Dunchaton Burn, (single property)	X				

Coull Wood				X	
Culvert under access track/ causeway to Coull Wood and two properties	X				
[redacted]		X			X
[redacted] under the B9152	X				
The Doune; garden area and specimen trees		X			X
The Doune; bankside beech trees		X		X	
Rothiemurchus Fishery (burrowing compromising the integrity of the fish ponds)			X		
[redacted], Rothiemurchus		X			X
Aviemore Waste Water Treatment Works	X	X			

Table 6. High impact sites outwith the initial release sites

	Impacts				
Location	Damming/ Flooding	Tree felling	Burrowing	Biodiversity Impact	Gardens
Laggan Floodplain/ Floodbanks (			X		
Un-named burns going through Aviemore	X	X			X
Milton Loch, Boat of Garten	X	X			X
Boat of Garten to Grantown Floodplain/ Floodbanks			X		
Strath Dulnain arable farmland			X		
Nethy Bridge Waste Water Treatment Works	X	X			
Duack Burn, Nethybridge (several properties)	X	X			
Dorback Burn, Nethybridge (one property, identified to date)	X	X			
Kylintra Burn. Grantown-on-Spey (numerous properties)	X	X	X		X
Culvert/ underpass under A95 to "Grantown Beach"	X				

Once beaver signs are identified in these area then monitoring will commence.

5. Identified generic issues potentially requiring mitigation

Initial monitoring will focus on the release areas, as beavers expand this monitoring will increase its range to new territories and the maximum extent of prospecting by single beavers.

Table 7. Mitigation – generic issues

Issue	Monitoring	Mitigation required/ action that could be taken
Felling of trees with high amenity value	Regular visits (initially weekly) and communication with landowners/ managers whose land is within 50m of water, in a beaver territory	Risk Assessment (how close to water) Identification of vulnerable trees to monitor. Tree wrapping or deterrent fencing
Felling of trees with high biodiversity value	Regular visits (initially weekly) and communication with landowners/ managers whose land is within 50m of water, in a beaver territory	Risk Assessment (how close to water) Identification of vulnerable trees to monitor. Tree wrapping or deterrent fencing
Unstable trees (due to beaver gnawing) close to houses, paths and roads	Regular visits (initially weekly) and communication with landowners/ managers whose land is within 50m of water, in a beaver territory	Risk Assessment (how close to water) Identification of vulnerable trees to monitor. Tree wrapping or deterrent fencing Felling of unstable trees
Impact on garden ground	Regular visits (initially weekly) and communication with landowners/ managers whose land is within 50m of water, in a beaver territory	Risk Assessment (how close to water) Deterrent fencing
Dams causing unacceptable impacts (under two weeks old)	Regular visits (initially weekly) and communication with landowners/ managers whose land is within 50m of water, in a beaver territory	Identification of locations within the beaver territory vulnerable to damming Installing a flow device Dam removal
Dams causing unacceptable impacts (over two weeks old)	Regular visits (initially weekly) and communication with landowners/ managers in a beaver territory within 20m of water	Identification of locations within the beaver territory vulnerable to damming Installing a flow device or dam removal

Impacts on Migratory Salmonids (on known spawning burns)	In addition to the above monitoring by the Spey Fishery Board biologist and Park Authority Ecologist when a dam appears on a spawning burn	If the monitoring shows and unacceptable impediment to migratory salmonid passage, then a licence application to remove the dam will be made
Translocation of resident beavers from areas where they could/ are causing unacceptable impacts	Regular visits (initially weekly) and communication with landowners/ managers whose land is within 50m of water, in a beaver territory	Other mitigation techniques need to have been shown not to have worked for a Translocation licence application to be made Translocation of beaver within the Park
Potential destabilisation of flood embankments due to resident beavers	Regular visits (initially weekly) and communication with landowners/ managers whose land has flood embankments to establish the risk to the embankments due to the beaver e.g. singleton passing through or resident family, presence of a lodge	Other mitigation techniques need to have been shown not to have worked for a Translocation licence application to be made Translocation of beaver within the Park

6. Discussions with key stakeholders

As well as speaking to landowners and land managers key public organisations who have infrastructure within high impact areas have been contacted. They include Scottish Water, Transport Scotland, Highland Council (Roads) and Network Rail.

Scottish Water, Transport Scotland, Highland Council (Roads) have all intimated that they will deal with impacts as they occur and would welcome any beaver distribution or impact information being shared with them at the earliest opportunity. We have named contacts in all these organisations to get in touch with directly.

The Park Authority and NatureScot had two meetings with Network Rail and they stated with regard to the railway embankment along Insh Marshes, “given the frequency of the aerial inspection we can undertake, it won’t be necessary for a dedicated third party team to look at this routinely as long as there is a forum available for us to discuss anything of concern with the

National Park and the *(RSPB Scotland Insh Marshes)* reserve". There is a helicopter flyover of this section of the railway capturing aerial imagery and lidar data.

With regard to water quality in public and private supplies Scottish Water and Highland Council (Environmental Health) did not have any objection to the translocation proposal Highland Council emphasised the responsibility of the owner of a private water supply to have a risk assessment of their supply undertaken and suitable purification equipment installed.

7. Mitigation underway or planned

Site identified as being of high risk close to the release sites have had a plan of action developed and will be delivered before the beavers are released close to these sites.

Table 8. Mitigation underway or planned

Location	Issue	Action	Date
Old Milton	Trees close to water	Tree wrapping. CNPA	Winter 2023/24
[redacted]	Garden very close to the water's edge	Deterrent fencing, tree protection. [redacted]	November/ December 2023
The Doune, Rothiemurchus	Trees close to water	Tree wrapping. CNPA	November/ December 2023
[redacted], Rothiemurchus	Trees close to water	Tree wrapping. CNPA	November/ December 2023
[redacted], Rothiemurchus	Maple close to water	Tree wrapping. CNPA	November/ December 2023
RSPB Scotland Insh Marshes Reserve	Aspen trees of biodiversity importance	Tree wrapping RSPB	Winter 2023/24
RSPB Scotland Insh Marshes Reserve	Osprey nesting tree	Tree wrapping RSPB	Winter 2023/24

Weldmesh was supplied to [redacted] and their staff are installing the fence and the tree protection. On the other sites CNPA staff are installing the tree protection.

8. Case study

[redacted] at Old Milton has requested that the mitigation plan and the subsequent works become a case study to demonstrate how such techniques work out in real life. The family partnership that runs Old Milton has confirmed that they will fund the mitigation required on the property, but with the proviso that there is a case study of these works and that this is publicised. As well as tree protection, reinforcing fencing will be used if the current deer fence with chicken wire does not prove to be a sufficient deterrent. There is also a zoning of the Milton Burn with the lower reaches being a zone where dams will be tolerated but the section the passes close to the property and above a culvert will be a "no dam zone" with dams being removed when they appear. As this ground is a mature and open canopy coniferous woodland, the expectation is that beavers will not be that active there. The case study will demonstrate if this is indeed the case

9. Annual reporting

The Old Milton Case study will be part of the annual beaver report that will be produced in December each year. This report will detail the mitigation that has been delivered in the last year, how successful it has been and what lessons have been learned from delivering the mitigation. In addition to the mitigation there will be a report on the released beavers, how they have settled into their territories, how far they have travelled, what behaviours they have been exhibiting etc.

A final report would be produced 5 years after a licence was approved. It would contain details of all the mitigation that has been delivered in that time, a review of its effectiveness, lessons learned and recommendations for future.

As the Park Authority has said, it wishes to be an exemplar of best practice, the demonstration of the mitigation techniques that have been used is a key part of that, determining if the techniques have succeeded or failed is another key output. We also wish to highlight any refinements to mitigation techniques or novel techniques that have been developed within the Park to share best practice.

10. Continuing professional development

Events demonstrating mitigation in action and new techniques will be held within the Park regularly. These events will be developed in negotiation with NatureScot, building on the preliminary discussions that have taken place to date.

Appendix 1

River Spey - Insh Marshes SAC – RSPB Insh Marshes beaver monitoring plan

Based on meeting held 25 October 2023.

Present: Karen Birkby (Site Manager, Insh Marshes), Thijs Claes (Species Officer/Curlew LIFE Project Officer), Adrian Samuels (Insh Marshes Assistant Warden), Heather McCallum (Ecologist), Kirsten Brewster (Scottish Beaver Mitigation Scheme Liaison Officer), Anne Elliott (Area Officer)

The purpose of this plan is to agree an approach to monitoring the effect of beaver on the designated sites on the RSPB Insh Marshes Nature Reserve. The designated site monitoring is a requirement of the Habitats Regulations Appraisal carried out to inform the beaver release process in the Cairngorms National Park. This monitoring is for the European sites because it is to meet the needs of the HRA, which only applies to European sites. The European designated sites which overlap with this reserve are:

1. Insh Marshes SAC
2. River Spey – Insh Marshes SPA
3. River Spey – Insh Marshes Ramsar
4. River Spey SAC

This monitoring will contribute towards the understanding of the impacts of beavers on the designated site features. Impacts could be positive, negative, or neutral, but for the purposes of the HRA, negative impacts are the important ones.

The likely period of monitoring required will be for five years. Clearly, impacts will not stop after five years, and ongoing monitoring requirements should be reviewed at that time.

It was agreed that:

- The monitoring method needs to be practical and achievable with existing resources. No new resources are available for this work.
- This monitoring only applies to areas which have beavers, or which could be impacted by beavers.
- It is recognised that areas with beaver are likely to change. Change is not necessarily a cause for concern. Additional work would only be triggered where a potential negative impact has been identified.

- Only the parts of the sites within RSPB ownership will be monitored under this plan.
- A risk-based approach will be used, with increased monitoring where there is a higher risk of impact. If a concern is identified from basic monitoring, this would trigger further investigation.
- The scale of beaver activity is likely to change over time, as the population increases. In the short term, small numbers would be present, and any impacts very localised. In the longer term, beaver will start to compete for resources, and their use of available habitat become more intensive. Monitoring methods will need to adapt to these changes, i.e., it will not be possible to monitor to the same extent if beavers become widespread.

It is recognised that there are many other habitats and species which are not features of European sites, but they are important in their own right. These will also be monitored, but not as part of this work.

There are three broad levels of monitoring.

Level	
1 - Everyday monitoring	Everyday monitoring happens all the time across the reserve. This is when staff, volunteers or the general public are on the site and report what they see, for example windblow, or a group of dead birds. It would pick up large changes in areas where people visit.
2 - Species or habitat check	Monitoring by staff or volunteers of a specific feature, which could be a habitat or species. This would give a broad check if all is well, or if a concern is identified. It will include visits to parts of the reserve which are not normally visited.
3 - Targeted monitoring	Targeted monitoring where a concern has been identified, and further information is required. All bird species are included in an annual bird survey across the reserve which is already carried out – this would deliver targeted monitoring.

It will be important to record the monitoring, so it can be used by CNPA in their reporting on the effects of beaver release. It is suggested that:

Level 1 monitoring would occur day to day and visits would not be recorded. The observations may need to be followed up if beaver signs are detected and there is potential for an impact – this would trigger level 2 or 3 monitoring, as required.
Level 2 would be specific to a habitat or species. It would be recorded in a table, with date, surveyor, location name, grid reference, habitat, observation and conclusion. This would be provided to CNPA annually.

Level 3 is a response to an identified impact, would be summarised in a short report and shared with CNPA.

Surveyors will be provided with guidance on field signs of beaver, and which lochs are the clear water loch feature, and how to identify transitional mire. Some features would be further monitored via fixed point photographs.

The level of monitoring for each feature is set out below. Note that some of the features are very similar but are not necessarily the same.

Feature	Comments	Monitoring and level
Insh Marshes SAC		
Alder woodland on floodplains	Present on River Tromie. The JNCC description of this habitat, states that lines of trees on riverbanks are not included. On the site as a whole, the Feshie fan has the largest extent of this habitat, but this site is outwith the RSPB ownership, which leaves the Tromie. This habitat is likely to be impacted by beavers from tree felling. A Herbivore Impact Assessment is being carried out to provide a baseline prior to beaver releases. HIA would be regular but not annually on the Tromie as it is rotated around the reserve. Deer management is informed by the results. Felling trees is not itself a problem – the problem would occur if there were no surviving new trees to replace them.	Herbivore Impact Assessment. Level 2, because an impact can be anticipated.
Lutra lutra Otter	Otter are present throughout the site, as shown by signs such as spraints. They are also picked up by cameras set out for predators across the site.	1
Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient Levels	Loch Insh plus other water bodies identified as this feature. Could be impacted by beaver activity. Priority feature for monitoring, which would be done during breeding wader surveys or other work, at identified locations. Further work required to identify which lochs and lochans contain this feature. Change is not necessarily a problem – the monitoring is to look for damage.	2 – features would be clear water, presence of vegetation on loch bed and sides.

	On the JNCC website, three species are mentioned for Loch Insh. RSPB records show 1 record each on the data base for shoreweed *Littorella uniflorae*, water lobelia *Lobelia dortmanna* and quillwort *Isoetes lacustris*. All are from Loch Insh and date to 1973. There are many records for other species such as *Potamogeton polygonifolius*, bulbous rush *Juncus bulbosus*, needle spike-rush *Eleocharis acicularis*, alternate water milfoil *Myriophyllum alterniflorum* and floating water bur-reed *Sparganium angustifolium*, yellow water-lily *Nuphar lutea,* and amphibious bistort *Persicaria amphibia*.	
Very wet mires often identified by an unstable `quaking` surface (transition mire)	It will be helpful to map the transition mire once most recent NVC surveys are completed. Change is not necessarily a problem – presence of dams, lodges or canals is acceptable, as are changes in water level. Water levels are already monitored in parts of the reserve. Changes in nutrient levels might be a concern, for example increase in reeds, *Typha* or common burr-reed, but a link to beaver would need to be demonstrated for this context. Transects were carried out in 2000 and 2015 to monitor changes and this will be repeated in 2024, as part of the LIFE project to monitor the effects of pony grazing on Coull Fen.	2 because the habitat is likely to be impacted by beaver activity. Repeating the transects would give a level 3 monitoring.
River Spey - Insh Marshes SPA		
Osprey *Pandion haliaetus*	Osprey forage throughout the SPA. There is currently one breeding pair on the reserve. Protection of nest tree might be necessary to prevent beaver damage.	3 – annual bird survey
Spotted crake *Porzana porzana*	Present and breeding.	3 – annual bird survey
Wood sandpiper Tringa glareola	Unlikely to be present on the reserve, but monitor if it appears.	3 – annual bird survey
Whooper swan *Cygnus cygnus*	Wintering whooper swans	3 – annual wintering bird survey

Hen harrier *Circus cyaneus*	Wintering birds.	3 – annual wintering bird survey
Wigeon *Anas penelope*	Breeding wigeon	3 – annual bird survey
River Spey – Insh Marshes Ramsar site		
Mesotrophic Loch	The Ramsar site citation clearly restricts this habitat to Loch Insh. Possible changes to vegetation on the loch shore, but negative changes not likely.	1
Flood-plain mire	Occurs across the marshes. Widespread across the site. The most fragile element of the flood-plain fen is the transitional mire noted under the SAC.	1
Alder woodland with willow	Present on River Tromie. The JNCC description of this habitat, states that lines of trees on riverbanks are not included. On the site as a whole, the Feshie fan has the largest extent of this habitat, but this site is outwith the RSPB ownership, which leaves the Tromie. This habitat is likely to be impacted by beavers from tree felling. A Herbivore Impact Assessment is being carried out to provide a baseline prior to beaver releases. Felling trees is not itself a problem – the problem would occur if there are no surviving new trees to replace them.	Annual site visit with Herbivore Impact Assessment to monitor grazing levels. Level 2, because an impact can be anticipated.
Vascular plants	Species specifically listed in the citation are string sedge, Scandinavian small-reed, least yellow water lily, cowbane, shady horsetail and pillwort. Of these, the species thought to be most vulnerable to grazing by beaver are Scandinavian small-reed and least water lily. Scandinavian small-reed due to restricted distribution, and least yellow water lily due to potential preference for forage plant. Cowbane is widespread and not generally vulnerable to grazing. String sedge is also widespread and has a wide tolerance to wetness. Least yellow water lily is already mapped.	3. Survey of vulnerable plants, one or two species a year on rotation.

Invertebrate assemblage	Long list of species and habitats listed. The initial habitats identified are wetland, open water, river shingles, sandy riverbanks, aspen, and birch. Vulnerable species would be those dependent on trees such as aspen hoverfly (which needs layer under bark in large aspen trees). Dark bordered beauty moth uses aspen suckers which should be resilient but might be vulnerable to increased wetness in one area. Risk-based approach – aspen hoverfly and dark bordered beauty are already monitored.	3 for aspen hoverfly and dark bordered beauty moth. Further work required on invertebrate feature.
Otter	Otters are present throughout the site, as shown by signs such as spraints.	1
Osprey	Osprey forage throughout the SPA. There is currently one breeding pair on the reserve. Protection of nest tree might be necessary to prevent beaver damage.	3
Spotted crake	Present and breeding.	3
Wood sandpiper	Unlikely to be present on the reserve, but monitor if it appears.	3
Wigeon	Breeding wigeon	3
Whooper swan	Wintering whooper swans	3
River Spey SAC		
Otter	Otter have already been assessed above.	1
[redacted]	[redacted]	[redacted]
Atlantic salmon *Salmo salar*	Salmon occur in the River Spey and the larger tributaries, at all stages of their life cycle. Greatest impacts are building of dams across tributaries. If dams are found they will need to be assessed with Spey Fishery Board and CNPA – dams could be left in place if no negative impact is likely, or for further research into the interaction between beaver and salmon. Most likely tributaries for beaver dams would be Raitts Burn or Ruthven	1 but escalate to 3 if beaver impact likely for example via dam on Raitts Burn or Ruthven Burn.

	Burn. The rivers Tromie and Spey are too large to be dammed by beaver.	
Sea lamprey *Petromyzon marinus*	Sea lamprey have been found as high upstream as Kingussie, but most occur much further downstream. No interaction with beaver is anticipated as they live wholly in-river and the habitats which support them would still occur in the presence of beavers.	1

SSSI features

The SSSI features are not part of the HRA delivery, but for convenience, are listed below.

Feature	Comments	Monitoring and level
Flood-plain fen (same as flood-plain mire in the Ramsar citation)	Occurs across the marshes. Widespread across the site. The most fragile element of the flood-plain fen is the transitional mire noted under the SAC.	1
Mesotrophic loch	Only Loch Insh is named on the citation.	1
Vascular plant assemblage	For further discussion on vascular plants, see below. The SSSI vascular plant assemblage is longer than the Ramsar one. Species thought to be most vulnerable to grazing by beaver are Scandinavian small-reed, downy currant and least water lily. Cowbane is widespread and not generally vulnerable to grazing. String sedge is also widespread, and has a wide tolerance to differing wetness. Downy currant and least yellow water lily are already mapped.	3. Survey of vulnerable plants, one or two species a year on rotation.
Invertebrate assemblage – see below for citation	It is likely that beavers will cause small scale changes in habitat, which could have minor impacts on invertebrates. It is likely that invertebrates will be able to adapt to these changes, and in some cases, new habitat is likely to benefit some invertebrates. Long list of species and habitats listed. The initial habitats identified are wetland, open water, river shingles, sandy riverbanks, aspen, and birch. Vulnerable species	3 for aspen hoverfly and dark bordered beauty moth. Further work

	would be those dependent on trees such as aspen hoverfly (which needs layer under bark in large aspen trees). Dark bordered beauty moth uses aspen suckers which should be resilient but might be vulnerable to increased wetness in one area. Risk- based approach – aspen hoverfly and dark bordered beauty are already monitored.	required on invertebrate feature.
Breeding bird assemblage	The breeding birds are surveyed annually, so any changes would be identified and can be investigated if required.	3
Osprey Pandion haliaetus	Osprey forage throughout the SPA. There is currently one breeding pair on the reserve. Protection of nest tree might be necessary to prevent beaver damage.	3
Whooper swan, non-breeding	Wintering whooper swans	3
Otter	Otter are present throughout the site, as shown by signs such as spraints.	1
Arctic charr *Salvelinus alpinus*	The Arctic charr population is based on Loch Insh and they also spawn in the River Spey. There is no mechanism by which beaver would impact on Arctic charr, as charr feeding, breeding and resting habitats would not be affected by beaver.	1

Vascular plant assemblage

The following is based on advice from Sarah Smyth, NatureScot Biodiversity and Geodiversity Advisor, and RSPB staff, in particular Karen Birkby and Heather McCallum.

The vascular plant assemblage for SCM purposes are:

String sedge *Carex chordorrhiza*
Cowbane *Cicuta virosa*
Least water lily *Nuphar pumila*
Downy currant *Ribes spicatum*
Water sedge *Carex aquatilis*
Pillwort *Piluaria globulifera*
Narrow small-reed *Calamagrostis stricta*
Scandinavian small-reed *Calamagrostis purpurea.* This species is mostly found on Dunachton Estate, not the RSPB reserve. There is only one small patch on RSPB's land.

Of these, wet conditions will suit most.

The Calamagrostis species are of very limited distribution, and nationally rare. They may be attractive to beavers as they are relatively succulent vegetation. For these reasons, both the *Calamagroistis* will be specially monitored.

The downy currant occurs on the riverbanks and has had significant conservation effort into propagation and protecting the species from grazing. It is vulnerable to grazing and might be attractive to beaver, since is appears to be attractive to other grazing animals.

Nuphar pumila is nationally scarce. It is known as Least water lily and occurs on Insh Marshes. It is also called small yellow lily. *Nuphar lutea* is also called yellow water lily but this is not recorded from Insh Marshes. The two also hybridise (*N. x spenneriana*). Water lilies are thought to be vulnerable to grazing by beaver, being succulent, so would be apriority for monitoring.

Pillwort and water-awlwort *Subularia* might be vulnerable to fluctuations in water level and were not recorded from the site when last monitored in 2014. There are no records of water-awlwort on the RSPB owned land, and it may have occurred elsewhere on the site. The latter is not one of the named species, but it would be interesting if it was re-found.

Professor Nigel Willby from Stirling University has carried out monitoring in similar habitats. His advice is:

"You don't need annual monitoring, possibly biannual or start, mid and end phase but not annual. I do think you need a decent baseline survey however, and I'm not sure how up to date the available data would be in that respect so a resurvey might be needed. I'd probably focus on the ditches and lochans and the area within say 10m of them. However, one thing you can be sure of with beavers is that they'll often do the opposite of what you expect, or at least not where you'd expect it.

Trigger effects for monitoring would include digging, canal building, large scale uprooting and feeding, possibly large-scale willow felling if it opens up habitat and felled trees obscure what was previously open mire communities. I think some context is needed for this since as you know Insh is grazed and mown in places and the ditches are cyclically dredged, although I'm unsure when this last happened, so it is not exactly an undisturbed environment, and obviously a long period of flood water storage could influence the vegetation on much more general scale than

could all these more local activities. I suppose evidence of embankment burrowing on the Spey itself could also be a trigger as more blowouts could produce quite major hydrological effects with downstream effects on vegetation (not necessarily bad ones) if that happened."

Invertebrate assemblage – SSSI citation

This is the best site in Scotland for rare wetland invertebrates but also has an outstanding fauna associated with riverine habitats and woodland. The rare species includes flies (Diptera), beetles (Coleoptera), moths (Lepidoptera) and at least one species of spider (Araneae). Species include the aquatic beetle *Donacia aquatica*, the marshland fly *Tipula marginella* and other cranefly species, the horsefly *Hybomitra lurida* and the snipe-fly *Thereva inornata*. The wetland spider Wabasso *replicatus* is known only at this site in Britain. Riverine flies include species associated with shingle such as the empid *Tachydromia acklandi* and the robber fly Rhadiurgus variabilis. Species of sandy river banks include the craneflies *Limonia omissinervis* and *Rhabdomastix laeta*. The outstanding fly fauna also includes rare species found in woodland fringing the marshland including the aspen hoverfly *Hammerschmidtia ferruginea*, part of an exceptional saproxylic fauna living on aspen. The moths Rannoch sprawler *Brachionycha nubeculosa* and Cousin german *Protolampra sobrina* both feed on birch foliage in the woodlands above the marshes.

The site dossier for invertebrates' names has many more species than this.

Additional information on invertebrates from Heather McCallum
Communication from NatureScot that the correct list to use is the updated list in the Ramsar citation:- *Hammerschmidtia ferruginea* aspen hoverfly*, Rhamphomyia trigemina*, *Dorytomas rubrirostis*, *Dicranomyia omissinvervis*, *Tachydromia acklandi* and *Nephrotoma aculeata*.

Hammerschmidtia ferruginea aspen hoverfly - requires dead aspen wood at specific stage of rot for development of larvae. Larger trees provide suitable habitat for longer time period therefore removal of younger trees or prevention of regrowth from repeated herbivory may have negative effect. Host trees only suitable for few years (<5?) and so need for constant supply of new material. Bark stripping of felled trees or naturally fallen trees likely to render trees unsuitable, however risk of impact will depend on proximity of trees to existing water courses, flooding levels and proximity of nearest resident beavers.

Rhamphomia trigemina a dance fly with no ecological information known and only a single record on the NBN, impossible to assess any impacts on this species.

Dorytomas rubrirostis - we have no records of this and only records for this species on the NBN are in the south of England, we have a single record for D. tortix this was from Andy Skinner but he has listed as needing to be followed up due to lack of Scottish records for this species.

Dicranomyia omissinvervis a cranefly that is found on shaded river banks - essential that deer browsing occurs at a level to allow beaver coppice regrowth.

Tachydromia acklandi we have a single record on Loch Insh, however the ecological information suggests that this is a river shingle species. River shingles within the SSSI are unlikely to be impacted as most of the Tromie / Spey on or in the areas immediately upstream from the SSSI are unsuitable for damming.

Nephrotoma aculeata single record from 1952, this species likely requires sandy river banks under scrub. If this species really is there could be negatively impacted by beavers if there is high deer browsing pressure.

However, the list in **SSSI citation** is more comprehensive: *Donacia aquatica, Tipula marginella, Hybomitra lurida, Thereva inornata, Wabasso replicatus, Tachydromia acklandi, Rhadiurgus variabilis, Limonia omissinervis, Rhabdomastix laeta, Hammershimidtia ferruginea, Brachionycha nubeculosa, Protolampra sobrina*

Donacia aquatica potential for impacts to be negative if damming occurred in the Insh Fen ditches with local impacts on hydrology, however damming here has been assessed as low likelihood due to the distance from trees and the depth / substrate of the ditches, new niches for this species could be created by beaver canal digging and potentially pool creation.

Tipula marginella - no ecological information and no recent records, impacts unknown.

Hybomitra lurida - no recent records but may benefit from increased site wetness.

Thereva inornata - no records on the reserve.

Wabasso replicatus - no records since 2002, previous location unlikely to be favoured by beavers so any impacts likely to be low.

Rhadiurgus variabilis - has been recorded in local area but not on the reserve.

Limonia omissinervis - no records on the reserve.

Rhabdomastix laeta - no records of this species on the reserve or on NBN anywhere in UK!

Brachionycha nubeculosa - requires old birch which could be felled by beavers, however, plenty of this is available distant from the water course and therefore won't be vulnerable so beavers are unlikely to have a significant impact on this species.

Protolampra sobrina - prefers open birch and willow scrub. Potential for this to increase with beaver activity, provided deer numbers do not limit coppice regrowth.

Anne Elliott
17 November 2023
Thank you for comments and additions from Heather McCallum 30 October 2023 and Karen Birkby on 13 November 2023. These are incorporated into the document above.