

P2023022 IKM River Dee Bridge desk-based assessment



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Client

IKM Consulting Ltd.

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Table of Contents

1. Introduction	1
1.1. River Dee.....	1
1.2. The project site.....	1
1.3. Project scope.....	2
1.4. Purpose of this document	2
2. Approach.....	3
2.1. Review of available information.....	3
3. Results.....	4
3.1. Desktop review.....	4
Protected areas and relevant species.....	4
Salmon distribution	4
Relevant species.....	4
Water Framework Directive, channel form and supporting information.....	6
Obstacles.....	6
Salmond distribution	6
Dee Fisheries Management Plan	6
3.2. Fish assessment.....	6
3.3. Drawing review.....	7
4. Discussion.....	8
4.1. Caveats and survey limitations.....	8
4.2. Fish habitat findings	8
4.3. Drawing review.....	8
4.4. Next steps.....	8
5. Mitigation	10
5.1 Fish.....	10
Potential specific fish mitigation.....	10
Seasonal sensitivity table	10
5.2 Generic mitigation advice	11
6. References.....	13

1. Introduction

1.1. River Dee

The River Dee is around 140 km long and rises in the Cairngorms. In its upland reaches, in the west of the catchment, it flows through land managed for sporting estates, fishing and tourism before flowing through arable dominated land and the city of Aberdeen in the east, where it joins the North Sea. The River Dee is renowned for its salmon fishing and is an important river in Scotland for nature conservation holding a Special Area of Conservation (SAC) designation. It is designated for its Atlantic salmon (*Salmo salar*), freshwater pearl mussel (FPM) (*Margaritifera margaritifera*) and otter (*Lutra lutra*).

1.2. The project site

The project site is located approximately 5 km from the mouth of the River Dee, where it discharges into the North Sea. The A92 crossing location, River Dee Bridge, serves as a connection between Aberdeen and Stonehaven. The River Dee Bridge is scheduled for scour repair work in 2023 by Aberdeen City Council. An assessment of the River Dee is required to identify any fish ecology constraints that need to be considered prior to the commencement of these works. The site is located at NJ 92856 03579 and is shown in Figure 1.1. The lower reaches of the Dee are within the Normal Tidal Limit (NTL) of the Dee Estuary, as per the OS Maps 1:25k layer, and ends approximately 650 m upstream of the works site. The entirety of the project site is located within the NTL and, therefore, will be under tidal influence.

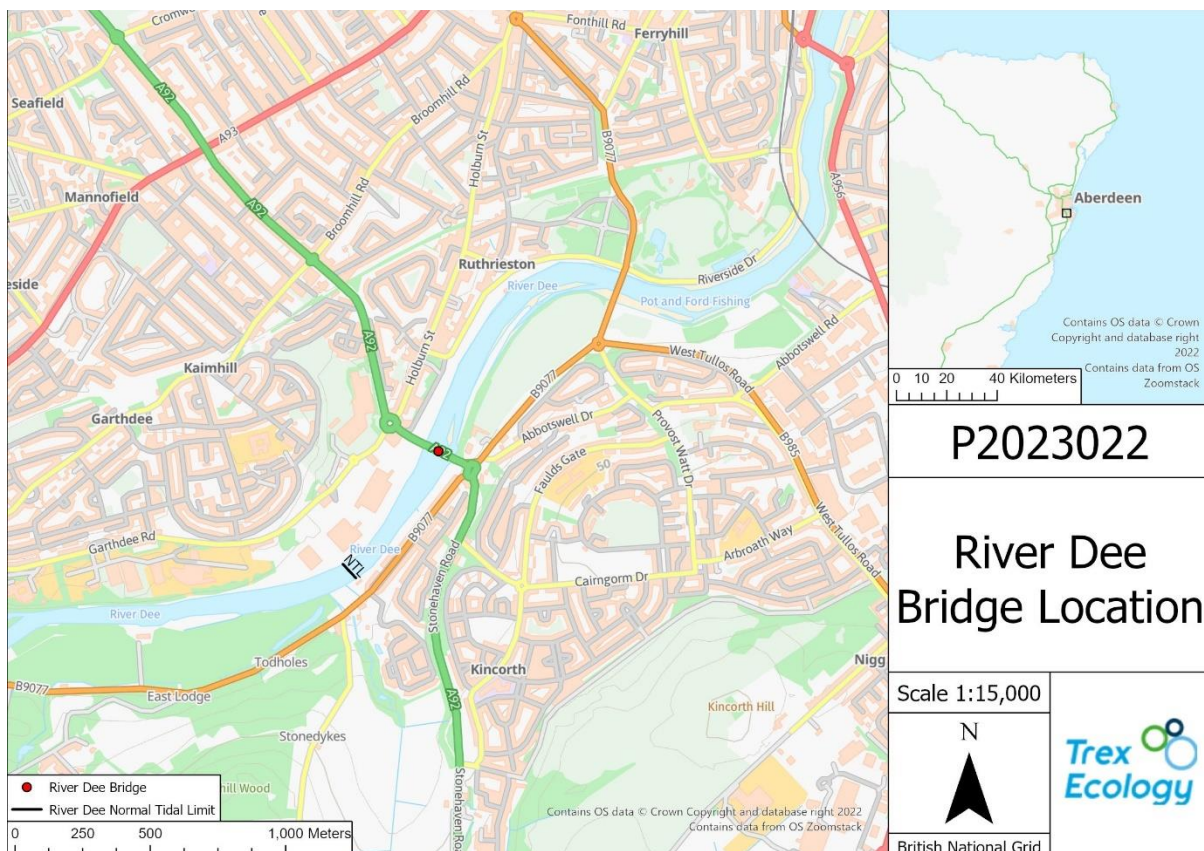


Figure 1.1. Location of River Dee Bridge

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1.3. Project scope

IKM Consulting Ltd. (IKM) contracted Trex Ecology Ltd. to undertake a Desk-Based Assessment (DBA) of the site to identify ecological receptors that could potentially be impacted by the works.

Specifically, Trex Ecology would deliver the following:

1. A DBA; and
2. A report of findings.

Additionally, Trex Ecology carried out an assessment of construction based on seven drawings (3255 – MHB_DRG_001, -010, -100, -101, -102, -120 & -121) upon receipt in August 2023, and after the finalisation of the Final report. Therefore, this document is Final V2.

1.4. Purpose of this document

This document presents the results of the DBA used to assess the ecological receptors potentially at risk from the repair works. It provides discussion and interpretation of the results obtained and presents early-stage mitigation, including the next steps (if needed), and provides comment on the drawing review.

2. Approach

2.1. Review of available information

A DBA was undertaken to assess available information on the presence of important and relevant ecological receptors in the area or other factors, such as the Water Framework Directive (WFD) Status Classifications, which could influence the outcomes of this report. It also highlights key regulatory information which should be understood. The sources of data assessed are shown below in Table 2.1.

When undertaken, the extent of a pre-works site walkover survey would encompass 500 m downstream of a works site and 100 m upstream as a standard approach when considering potential impacts from works, and this same extent will be considered for the DBA.

Table 2.1. Data sources assessed

Asset	Date accessed	Purpose
https://sitelink.nature.scot/map	24/05/23	Identify relevant protected areas
https://www.sepa.org.uk/data-visualisation/water-environment-hub/	24/05/23	Identify current WFD status of the site
https://marinescotland.atkinsgeospatial.com	24/05/23	Identify channel barriers
https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=843	24/05/23	Presence of salmon in Scottish Rivers
https://explore.osmaps.com/create-route?lat=57.121716&lon=-2.122732&zoom=14.4979&style=Leisure&type=2d	24/05/23	Aerial imagery
https://www.google.co.uk/maps	24/05/23	Aerial imagery
https://www.riverdee.org.uk/f/articles/Dee-Fisheries-Management-Plan-2020-25.pdf	24/05/23	Dee Fishery Management Plan
https://sitelink.nature.scot/site/8357	24/05/23	River Dee SAC Conservation Advice Package

3. Results

3.1. Desktop review

Protected areas and relevant species

The Dee SAC

The River Dee itself and many of its tributaries are within the River Dee SAC. The qualifying features of the SAC designation are FPM, Atlantic salmon, and otters. The population of Atlantic salmon in the Dee is considered to be in favourable maintained condition (NatureScot, 2020a). The Dee is also noted for hosting sub-populations of salmon which run at various times. The River Dee also supports a functional population of FPM which is considered to be in unfavourable declining condition (NatureScot, 2020a). However, as the site is within the NTL, FPM will not be present as they cannot tolerate saline conditions and, therefore will not be considered further within this assessment.

The River Dee SAC overlaps numerous other designations. However, many of these are significantly upstream of the works site and, as such, are not relevant to this report.

The Salmon Act

The River Dee is subject to the requirements of the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act, 2003, aka the Salmon Act, irrespective of whether it is located within a protected area, such as an SAC. Under this, it may be an offence to, recklessly or otherwise, interfere with the spawning and migration of anadromous salmonids. It also protects spawning habitats. This act is regulated by the local District Salmon Fishery Board (DSFB), in this case, the Dee District Salmon Fishery Board (DDSF).

Salmon distribution

The Scottish Salmon Rivers layer database available on the MSS map portal NMPi (MSS, 2022) shows salmon as being present in the works area indicating that diadromous fish; salmon, sea trout, river or sea lamprey will be able to access the works area. Due to the tidal influence of the site, this is likely to be an important transitional habitat for Atlantic salmon.

Relevant species

Atlantic salmon

Atlantic salmon are of high conservation value and protected under the European Habitats Directive and the Salmon Act. According to the Atlantic Salmon Trust, the wild salmon population is in crisis, with a decline in marine survival of 70% in just 25 years (Atlantic Salmon Trust, 2018). They are listed as a priority species for conservation on the Scottish Biodiversity List (NatureScot, 2020b).

The Dee catchment is famous for its sub-populations of salmon, including multi sea-winter spring salmon, summer salmon and grilse, and it is important to understand their migration timings. Spring salmon used to make up a sizeable portion of the catches on the Dee. In the 1950s-60s, 7,300 salmon were caught during spring, whereas a recent five-year average only recorded 800 fish per year, a decline of nearly 90% (The River Dee, 2020). Recent catches show that the majority of the salmon run from June to September (summer salmon), whilst autumn salmon have appeared in recent years (October), and spring salmon running from February to May are still present, albeit in lower numbers (see Figure 3.1).

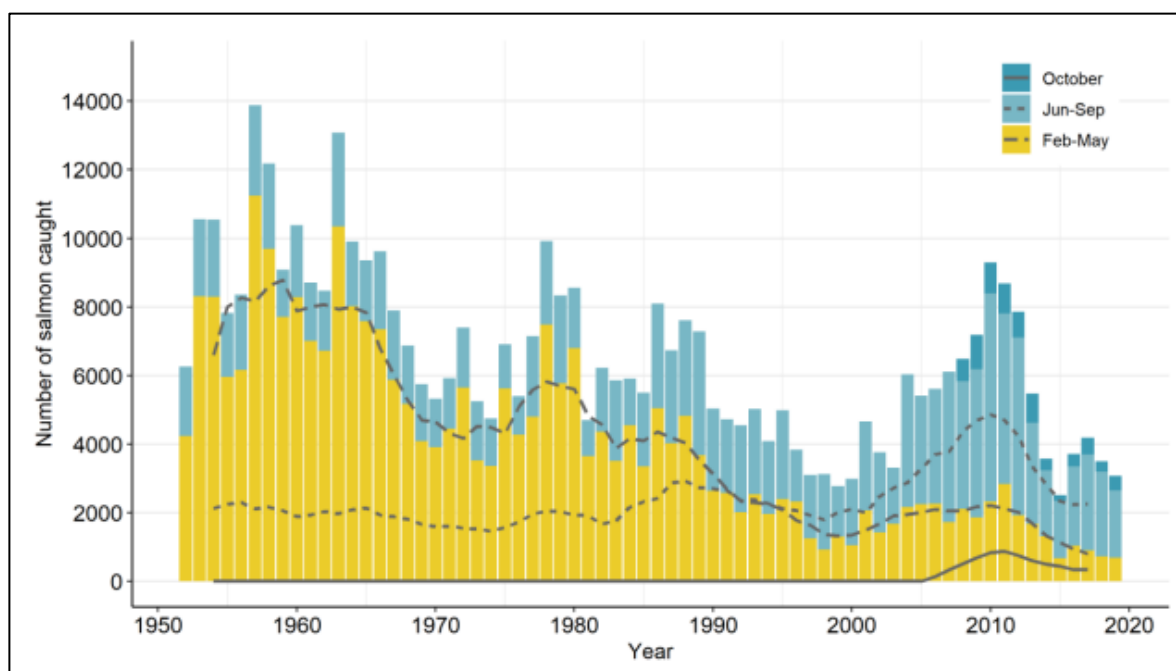


Figure 3.1. Salmon rod catches on the River Dee, 1952 – 2020 (The River Dee, 2020)

Trout

Sea trout are present in the Dee catchment and have the same legal protection as Atlantic salmon under the Salmon Act. It is not possible to establish with absolute certainty whether a given trout is a sea trout or resident brown trout based on observation of juveniles. This is an important consideration given the legal protection afforded to sea trout under the Salmon Act. Brown trout are listed as a priority species for conservation on the Scottish Biodiversity List, and their exploitation and capture are reserved under the Salmon Act.

European eel

The European eel is protected under The Freshwater Fish Conservation (Prohibition on Fishing for Eels) (Scotland) Regulations 2008 and is also protected by measures relating to previous compliance with Council Regulation (EC) No 1100/2007 - *Establishing measures for the recovery of the stock of European eel*. An eel management plan has been produced for Scotland (DEFRA, 2010) in support of this regulation, and they are also a priority species for conservation in the Scottish Biodiversity List. They are listed as *Critically Endangered* (Jacoby & Gollock, 2014) on the IUCN Red List of Threatened Species.

Lamprey

There are three species of lamprey found in Scotland, sea, river, and brook. Although none of these species holds specific protected status other than restrictions on their method of capture (Schedule 3 Conservation (Natural Habitats, &c.) Regulations 1994) (as amended), they can form the basis of protected area designations elsewhere in Scotland. They are also listed as priority species for conservation on the Scottish Biodiversity List. Brook lamprey are a freshwater species and as such will not be present within the NTL.

Water Framework Directive, channel form and supporting information

The River Dee at the River Dee Bridge is subject to two WFD designations, as the Bridge is used as a dividing point between designations. Downstream of the Bridge falls under Dee (Aberdeen) Estuary, SEPA Water Body (WB) ID 200103, which is a transitional WB. The WB has been designated as a Heavily Modified Water Body (HMWB) due to physical alterations that cannot be addressed without a significant impact on navigation and from an increased risk of subsidence or flooding and is considered to have Good ecological potential. However, Water Quality Elements (QEs), which include Overall Ecology and Hydromorphology, score Poor.

Upstream of the Bridge is classified as River Dee - Peterculter to tidal limit is a river, SEPA WB ID 23315. The WB has been designated as a HMWB on account of physical alterations that cannot be addressed without a significant impact from an increased risk of subsidence or flooding and is considered to have Moderate ecological potential. This has recently been upgraded from Bad ecological potential in 2019. QEs Overall Ecology and Hydromorphology, score Bad which prevents the WB from achieving a higher score.

Obstacles

There are no barriers listed on the SEPA barriers database hosted by Marine Scotland Science (MSS, 2021), that would therefore suggest that diadromous (migratory) fish (salmon, sea trout, river, or sea lamprey) can reach the works area. The works must not result in new barriers.

Salmond distribution

The Scottish Salmon Rivers layer database available on the MSS map portal NMPi (MSS, 2022) shows salmon as being present in the works area indicating that diadromous fish; salmon, sea trout, river or sea lamprey will be able to access the works area. Due to the tidal influence of the site, this is likely to be an important transitional habitat for Atlantic salmon.

Dee Fisheries Management Plan

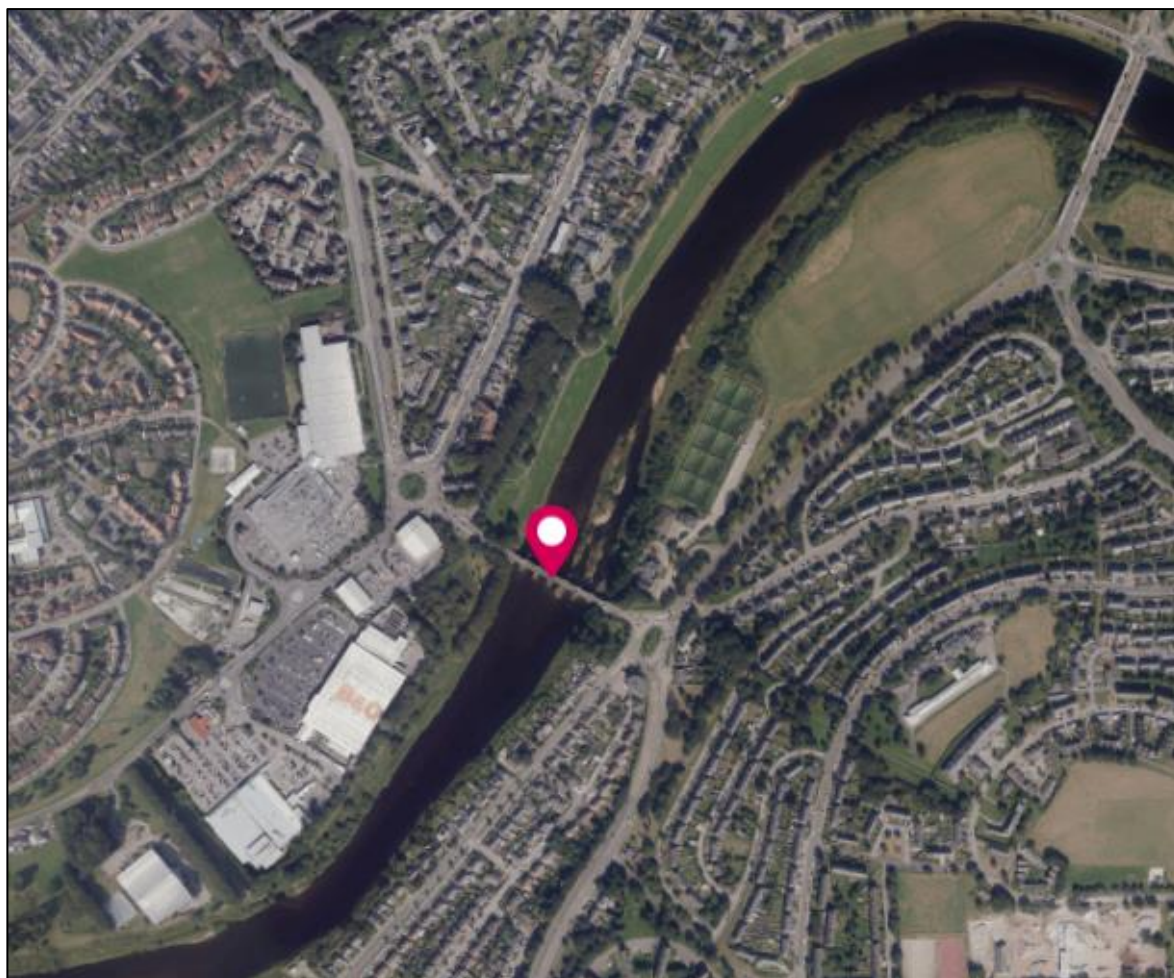
The Dee Fisheries Management Plan (FMP) (The River Dee, 2020), sets out several goals of the Dee District Salmon Fishery Board (DDSF) and River Dee Trust to protect and improve fish stocks within the catchment. Goal 1 is to protect fish stocks and their rivers. To achieve this goal, there are aims that are relevant to the project. These include, protecting fish migration, protecting adult fish, and protecting water quality and quantity. Protecting migration includes both the movement of adult fish into the catchment and smolts (juveniles) moving out to sea when fish are particularly vulnerable. To protect smolts, action is being taken to track the smolt run to further understand it and protect it. Developments will also be pushed for disturbance-free periods during environmental conditions (such as high flows and high tides) that are suitable for adult migration. It is also stated that they will provide guidance to help minimise disturbance and damage to fish habitats and insist that works are done outside spawning and emergence times¹. The FMP also looks to adopt a 'net gain' policy for any in-river works to create overall improvement for the river.

3.2. Fish assessment

A review of online aerial imagery and OS mapping (OS Maps and Google Earth) shows that the Dee is approximately 110 m wide at the works site. Upstream of the bridge, the flow type is primarily glide. However, this changes as the watercourse passes under the bridge, becoming primarily riffle. There are large areas of deposition in the channel downstream of the bridge in the form of two islands and

¹ It is considered that, due to the location, spawning is unlikely.

a barform on the righthand bank (Figure 3.2). The river returns to a glide for the remainder of the DBA extent approximately 200 m downstream of the bridge. The river at this point is low lying and runs through an urban area. Upstream of the bridge there is a retail park on the lefthand bank and a residential area on the righthand bank, whilst there is primarily parkland and residential areas downstream of the bridge. Although an urbanised reach, there is mature deciduous trees on both banks at the bridge and on the lefthand bank upstream and on the righthand bank downstream of the bridge. These have the potential to provide cover and habitat for fish along with shade in the summer when water temperatures increase.



Contains OS data ©Crown copyright and database rights2022©Maobix©OpenStreetMap

Figure 3.2. Works site showing treelined banks at the bridge and areas of deposition in the channel.

3.3. Drawing review

The drawings provided show that the mattress will extend approximately 75% across the channel and surrounding all but one of the bridge footings. Details show that each span will be connected to the mattress via sheet piling and bolt, with bolster seals. Bank tie in will be provided via riprap bank reprofiling and with the mattress toed into the bank. Tie-in to the downstream and adjacent bed will be via the toed mattress underneath rock armour. Bed level will be reinstated across all structures.

4. Discussion

4.1. Caveats and survey limitations

This report is based on a desk-based assessment, using online resources only and has not been accompanied by a site visit.

4.2. Fish habitat findings

The DBA revealed the potential presence of all diadromous species within the River Dee, including salmon, sea trout, eel, and lamprey (sea and river). It is important to consider that this site is within the Dee Estuaries NTL; this will affect how diadromous fish use the area. Salmon spawning will not be present as juvenile salmon are not able to fully tolerate saltwater until they become smolts (Duston, 1994) when they can spend considerable time in tidal reaches (Weitkampetal *et al.*, 2014). Other species may rarely spawn in tidal reaches such as sea trout (Gabrielsen *et al.*, 2021) and anadromous lamprey (Kurz & Costello, 1999). However, this is likely to be incredibly uncommon and they primarily migrate through these reaches to spawn upstream in freshwater environments. Eels live in freshwater environments and spawn at sea (catadromous); therefore, their primary concern is migration.

Therefore, given the location it would be prudent to protect diadromous fish migration, river entry by adult salmonids and lamprey, juvenile entry by eel, smolt passage and kelt passage over any spawning concerns.

Mitigation will be required to ensure that there are no adverse impacts to these habitats and species during works, further detail of which is provided in Section 5 below. In particular, it is important to understand the timing of when species migrate, such as the run time of sub-populations of salmon as outlined in Section 3.1. A seasonal sensitivity for all diadromous species is provided in Section 5 and further dialogue with the DDSFB will be needed to confirm this as well as ensuring that the project adheres to their FMP.

As the River Dee Bridge is within the NTL of the Dee Estuary, FPM will not be present at the site; and FPM have been scoped out.

4.3. Drawing review

The provided construction drawings show a standard build using constructed mattress and rock to tie-in, and bed level reinstated throughout the site. As only (approximately) 75% of the channel is to be worked, fish passage should be guaranteed throughout construction. In common with all such projects which work on the riverbed, but particularly due to the very sensitive position of the works just above the river entry to the Dee SAC, the constructed structure must not promote vertical scour immediately downstream of the mattress toe, and sporadic checks should be carried out post-construction to ensure this is happening. However as 25% of the bed is not subjected to works and presumably will remain open should some vertical bed scour occur; this could sit with standard bridge inspection surveys being carried out by the transport authority.

4.4. Next steps

General mitigation that should be followed is outlined in Section 5 below.

Discussions with SEPA and the DDSFB are advised to agree on specific fish mitigation requirements.

P2023022 IKM River Dee Bridge assessment



5. Mitigation

5.1 Fish

The mitigation proposed here considers the transitional nature of the site and assumes the accessibility of the reach to Atlantic salmon, sea trout, river lamprey and sea lamprey and eel, and use by resident brown trout.

The specific protection of key fish species in Scotland is hampered by the absence of a single reference which explicitly details measures to be taken to mitigate impacts during the construction and operation of in-channel projects. Very often, project-specific mitigation is based on the nature and detail of a consultation response with the local DSFB and other environmental regulators. The DDSFB should be consulted when seeking the formal regulatory pathway to discuss any requirements for any future works on the rivers.

The fish mitigation proposed here is based on previous construction projects, previously agreed mitigations, and unrelated discussions with regulators. Other sources relating to CAR licensing and SEPA pollution prevention measures are also presented. It should be recognised that definitive mitigation cannot be determined at this early stage.

Potential specific fish mitigation

For any works which will isolate fish from the main channel, or which require a dry working area, a fish rescue should be considered. Due to the tidal influence at the site location, a site visit between the contractor and a fish ecologist will be required in advance to determine the methods of fish rescue required for all species identified here.

This site will be important for the specific river entry of migratory fish (adult salmon, sea trout, sea and river lampreys) (see Figure 5.1. below for timings) seaward migration of kelts (November to March), smolts (April/May) and juvenile eel (March to June). Therefore, it is important that local run timings are understood prior to determination of works programmes. This will require engagement with DDSFB. Specific measures such as no works at mid to high tide, may be required to protect migrating fish.

For eel, the most sensitive stage is juvenile upstream migration, occurring during spring and early summer when “trains” of these small fish can be seen moving upstream along close to the riverbank. If works are to be carried out during these periods, then a suitably qualified EcoW should be present to support mitigation. Measures can range from simple rescue using hand nets or more complex operations using electrofishing kit, to simply suspending work for a period of time to allow passage.

Seasonal sensitivity table

It should be assumed that all diadromous fish native to the region (Atlantic salmon, sea trout, lamprey, European eel), as well as resident brown trout, are present within the survey extent. A seasonal sensitivity table is presented in Figure 5.1. This should be confirmed with the DDSFB to ensure the proposed timings are relevant to the River Dee Catchment. Although spawning is unlikely given the location, timings are left within the table as precaution.

The timings of key sensitivities are presented as high sensitivity in red, medium sensitivity in orange, and low sensitivity in yellow. Periods where the receptor is absent or not sensitive are white.

Key

	HIGH SENSITIVITY
	Medium sensitivity
	Low sensitivity
	Non sensitive/absent

Species	Stage	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Atlantic salmon	Adult migration	High	Med	Low	Low	Low	Med	Med	Med	Med	High	High	High
	Spawning		Med	High	High	High							
	incubation			Med	High	High	High	High	High	Med			
	Swim up							Med	High	High			
	winter dispersal	Med	High	High									
	smolt migration							Med	High	High	Med		
	Kelts			High	High	High	High	High					
Brown trout (*sea trout)	Adult migration	High	High	High	Med	Med	Low	Low	Low	Low	Low	Low	Med
	Spawning	High	High	High	High	Med							
	incubation	Med	High	High	High	High	High	Med	Med				
	Swim up						Med	High	High				
	winter dispersal	Med	High	High									
	smolt migration*							Med	High	High	Med		
	Kelts				High	High							
Eel	Adult migration	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
	Juvenile migration								Med	High	High	High	Med
Lamprey (sea and river)	Adult migration	High	High	High	High				High	High		High	High
	Spawning							High	High	High	High		
	incubation									High	High	High	
	Juvenile migration	High								High	Med	High	High

Figure 5.1. Generic seasonal sensitivity table for fish species possibly present

5.2 Generic mitigation advice

Supporting guidance on applying environmental standards and good management practices in relation to large-scale construction sites and pollution control is provided in WAT-SG-74 (SEPA 2018b). This document outlines the Pollution Prevention Plan (which will have to be submitted to SEPA as work begins or extends beyond the 1st of September). It may also be necessary to produce a Spill Response Plan (SRP). This should utilise SEPA document Guidance for Pollution Prevention (GPP) 22 (SEPA, 2018a).

Any construction sites will be subject to The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended, 2021) (a.k.a. Controlled Activities Regulations – CAR) and, as a minimum, works will be required to correspond with the General Binding Rules (GBRs) within CAR, (see A Practical Guide, SEPA 2021). The specific GBRs should be discussed with SEPA as part of the CAR licensing processes; however, the following measures should be implemented:

- i. Waste Management
 - a. Store wastes in areas away from surface/foul drains and watercourses;
 - b. Cover waste containers; and
 - c. Store waste oils in 110% bunding.
- ii. Water Management
 - a. Obtain permission to discharge silt laden waters to land from landowners and consult with SEPA prior to discharge;
 - b. Plant and equipment entering or working alongside watercourses should be well maintained, clean and free from leaks; and
 - c. Implement and maintain control measures to help ensure site drainage does not contaminate drains or watercourse, e.g., cut off ditches/silt fences.
- iii. Environmental control measure(s)
 - a. Develop a spill response plan;
 - b. Store hazardous materials more than 10m from a watercourse or surface water and/or foul drainage gullies;
 - c. Maintain and inspect hazardous material bunds and spill kits;
 - d. Monitor hazardous material storage areas for leaks and signs of spillage;
 - e. Provide spill kits with instructions in areas of high risk;
 - f. Undertake spill response exercises/drills at a frequency as defined within the Spill Response Plan;
 - g. Train staff in the use of spill kits and the correct disposal of used material;
 - h. Undertake all plant refuelling on hardstanding or within define areas utilising drip trays/plant nappies;
 - i. Conduct refuelling activities at least 10m away from watercourses or surface/foul water drainage gullies;
 - j. Locate spill kits in all appropriate locations, with instructions for use; and
 - k. Ensure training has been provided.

Suitably qualified construction contractors will be aware of these measures, and they will be included in an appropriate Construction Environmental Management Plan (CEMP).

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