

**A66 Northern Trans-Pennine Project
TR010062**

**3.4 Environmental Statement
Appendix 6.19 Fish**

APFP Regulations 5(2)(a)

Planning Act 2008

**Infrastructure Planning (Applications: Prescribed Forms and
Procedure) Regulations 2009**

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Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed
Forms and Procedure)
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A66 Northern Trans-Pennine Project
Development Consent Order 202x

**3.4 ENVIRONMENTAL STATEMENT
APPENDIX 6.19 FISH**

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6.19 Fish

6.19.1 Introduction

6.19.1.1 The A66 Northern Trans-Pennine project is a programme of works to improve the A66 between the M6 at Penrith and A1 at Scotch Corner.

6.19.1.2 Between the M6 and the A1(M) the existing A66 is approximately 80km in length. Along this length it is intermittently dualled, with approximately 30km of single carriageway, in six separate sections, making the route accident prone and unreliable.

6.19.1.3 The route carries high levels of freight traffic and is an important route for tourism and connectivity to local communities. The variable road standards, together with the lack of available diversionary routes when incidents occur, affects road safety, reliability, resilience and attractiveness of the route. For a full project description see Chapter 2: The Project (Application Document 3.2).

6.19.2 Legislation and Policy Framework

Legislation

6.19.2.1 A framework of international, European, national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. Legislation relevant to fish and discussed within this report are:

- Salmon and Freshwater Fisheries Act 1975 (as amended)
- Natural Environment and Rural Communities (NERC) Act 2006
- EC Directive Conservation of Natural Habitats & Flora (92/43/EEC)
- The Water Framework Directive (WFD) 2000/60/EC
- Eels (England and Wales) Regulations 2009.

Salmon and Freshwater Fisheries Act 1975 (as amended)

6.19.2.2 All species of freshwater fish are protected under the Salmon and Freshwater Fisheries Act (SaFFA) 1975 (as amended). SaFFA aims to protect freshwater fish and their habitats, with a particularly strong focus on salmonid species. The legislation covers a broad range of topics, but of particular relevance to development are those sections covering water pollution, habitat disturbance and fish migration routes. Under Section 2 (4) it is an offence to wilfully disturb spawn, spawning fish or spawning areas, and under Section 4 (1) it is an offence to knowingly permit the flow of poisonous matter and polluting effluents into river courses that are poisonous or injurious to fish or the spawning grounds, spawn or food of fish.

6.19.2.3 Sections 9 to 15 are concerned with fish passage and migration routes. It is the duty of the waterway owner that when constructing dams, screens or sluices to provide and maintain a facilitating fish pass for migrating salmon or trout.

Natural Environment and Rural Communities Act 2006

- 6.19.2.4 The NERC Act 2006 is designed to help achieve a rich and diverse natural environment and thriving rural communities. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40.
- 6.19.2.5 Under Section 40 there is a Duty to conserve biodiversity; specifically, Subsection (1) states “Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.”
- 6.19.2.6 The following freshwater fish are listed as Species of Principal Importance (SoPI) under S41: common sturgeon (*Acipenser sturio*), allis shad (*Alosa alosa*), twaite shad (*Alosa fallax*), European eel (*Anguilla anguilla*), spined loach (*Cobitis taenia*), vendace (*Coregonus albula*), whitefish (*Coregonus lavaretus*), burbot (*Lota lota*), Atlantic salmon (*Salmo salar*), brown/sea trout (*Salmo trutta*), Arctic charr (*Salvelinus alpinus*), river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*).

EC Directive Conservation of Natural Habitats & Flora (92/43/EEC)

- 6.19.2.7 The Conservation of Habitats and Species Regulations 2017 consolidated and updated the Conservation of Habitats and Species Regulations 2010 (as amended). They are the British response to the Habitats and Species Directive 1992 issued by the European Community (EC) (which is now the European Union (EU)). They offer protection to a number of plant and animal species throughout the EC via the designation of Special Areas of Conservation (SACs).
- 6.19.2.8 Core areas of habitat for species listed on Annex II of the Habitats Directive are designated as sites of Community importance (SCIs) and included in the Natura 2000 network. These sites must be managed in accordance with the ecological needs of the species.
- 6.19.2.9 UK freshwater fish species listed on Annex II are: allis shad, brook lamprey (*Lampetra planeri*), twaite shad, sea lamprey, spined loach, river lamprey, European bullhead and Atlantic salmon. These species and the habitats that support them are protected under the Habitats Directive when associated with Natura 2000 site. Outside of a Natural 2000 site, these species are still considered to be of conservation value.

The Water Framework Directive (WFD) 2000/60/EC

- 6.19.2.10 The WFD is a legal framework for the protection and restoration of inland surface waters, transitional water, coastal waters and groundwater. The WFD introduced a comprehensive river basin management planning system to help protect and improve the ecological health of the water environment. This is underpinned by

the use of environmental standards to help assess risks to the ecological quality of the water environment and to identify the scale of improvements that would be needed to bring waters under pressure back into a good condition.

6.19.2.11 Under WFD many activities need approval before they can go ahead. A WFD assessment is required to enable the public body that regulates and grants permissions for your activity to provide consent.

6.19.2.12 The WFD aim is for all water bodies to be at good status. A WFD assessment must demonstrate that an activity will not:

- Cause or contribute to deterioration of status
- Jeopardise the water body achieving good status in future.

6.19.2.13 Fish is one of the biological quality elements (along with "macroinvertebrates" and "macrophytes and phytobenthos combined") typically used to provide WFD status in rivers and form part of the WFD assessment.

Eels (England and Wales) Regulations 2009

6.19.2.14 The Eels (England and Wales) Regulations 2009 implement Council Regulation (EC) No 1100/2007 of the Council of the European Union, establishing measures for the recovery of the stock of European eel. The Regulations are focussed on the management of commercial eel fisheries (licences, catch returns and restocking) and the passage/migration of eels. The regulations afford powers to the regulators (Environment Agency and Natural Resources Wales) to implement recovery measures in all freshwater and estuarine waters in England and Wales.

6.19.2.15 Part 4 of the regulations is concerned with the passage of eels and makes it a legal requirement to notify the regulator of the construction, alteration or maintenance of any structure likely to affect the passage of eels. This include water intakes and outfalls, dams and weirs, sluices or any other in-river obstruction. Where any such structure exists, the owner, occupier or person in charge of the land on which the dam, structure or obstruction lies may be required to construct and operate an eel pass to allow the free passage of eels.

National level policy

6.19.2.16 The primary policy basis for deciding whether or not to grant a Development Consent Order (DCO) is the *National Policy Statement for National Networks (NPSNN)* (Department for Transport, 2014)¹, which sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered by the relevant decision maker. The policies for biodiversity and ecological conservation include statements that:

“Biodiversity is the variety of life in all its forms and encompasses all species of plants and animals and the complex ecosystems of which they are a part. Government policy for the natural environment is set

¹ Department for Transport (2014) National Policy Statement for National Networks^f

out in the Natural Environment White Paper (NEWP). The NEWP sets out a vision of moving progressively from net biodiversity loss to net gain, by supporting healthy, well-functioning ecosystems and establishing more coherent ecological networks that are more resilient to current and future pressures...” (NPSNN paragraph 5.20).

6.19.2.17 The NPSNN also advises:

“In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national and local importance, protected species, habitats and other species of principal importance for the conservation of biodiversity, and to biodiversity and geological interests within the wider environment.” (NPSNN paragraph 5.26).

Table 1: NPSNN policies.

Relevant NPSNN paragraph reference	Requirement of the NPSNN (paraphrase)
5.22	Outline any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity and that the statement considers the full range of potential impacts on ecosystems.
5.23	Demonstrate how the project has taken advantage of opportunities to conserve and enhance biodiversity conservation interests.
5.29	Ensure proposals mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site’s biodiversity are acceptable.
5.33	Development proposals potentially provide many opportunities for building in beneficial biodiversity features. Opportunities to maximise beneficial biodiversity features should be considered. Planning obligations can be used where appropriate in order to ensure that such beneficial features are delivered.
5.34 and 5.35	Individual wildlife species receive statutory protection under a range of legislative provisions. Other species and habitats have been identified as being of principal importance for the conservation of biodiversity in England and Wales. Undertake measures to ensure these species and habitats are protected from adverse effects. Where appropriate, requirements or planning obligations may be used in order to deliver this protection.
5.36	Include appropriate mitigation measures as an integral part of their proposed development, including identifying where and how these will be secured
5.37	Consider what appropriate requirements should be attached to any consent and/or in any planning obligations entered into in order to ensure that mitigation measures are delivered.
5.38	Take account of what mitigation measures may have been agreed between the applicant and Natural England and/or the Marine Management Organisation (MMO), and whether Natural England and/or or the MMO has granted or refused, or intends to grant or refuse, any relevant licences, including protected species mitigation licences.

National planning policy framework

- 6.19.2.18 The *National planning policy framework (NPPF)* (Ministry of Housing, Communities & Local Government, 2021)² originally published in March 2012 and most recently updated in July 2021, sets out the government's planning policies for England and provides a framework within which locally prepared plans can be produced. The NPPF is “an important and relevant matter to be considered in decision making for NSIP³”.

Regional and local level policy

- 6.19.2.19 A number of fish species including, sea lamprey, river lamprey, salmon, brown trout and European eel are listed in the *Cumbria Biodiversity Action Plan species list* (Cumbria Wildlife Trust, 2018)⁴. Salmon, wild brown trout and European eel are listed as priority species in the *Durham Freshwater Fish Action Plan* (North East England Nature Partnership, 2022)⁵.

Other relevant policy and guidance

- 6.19.2.20 In addition to compliance with the *NPSNN* and *NPPF*, this report has been written in accordance with professional standards and guidance. The standards and guidance which relate to the assessment are:
- *Guidance for Ecological Impact Assessment in the United Kingdom Third Edition* (Chartered Institute of Ecology and Environmental Management, 2018)⁶

IUCN Red List of Threatened Species

- 6.19.2.21 Established in 1964, the International Union for Conservation of Nature (IUCN) Red List of Threatened Species has evolved to become the world's most comprehensive information source on the global conservation status of animal, fungi and plant species.
- 6.19.2.22 The IUCN Red List is a critical indicator of the health of the world's biodiversity. European eel (*Anguilla anguilla*) are listed as Critically Endangered on the IUCN Red List due the rapid decline in numbers witnessed in the later half of the 20th century.

6.19.3 Methodology

Desk study

- 6.19.3.1 For the purposes of the desk study, data was sought for any watercourses within the Order Limits plus a 2km buffer.

² Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework

³ Nationally Significant Infrastructure Projects (NSIP)

⁴ Cumbria Wildlife Trust (2018) Cumbria Biodiversity Action Plan Species updated listf

⁵ North East England Nature Partnership (2022) Freshwater Fish Action Plan /

⁶ Chartered Institute of Ecology and Environmental Management (2018) Guidance for Ecological Impact Assessment in the United Kingdom Third Edition

Environment Agency Data

- 6.19.3.2 The Environment Agency ecology and fish data explorer (Environment Agency, 2021)⁷ and GIS were used to identify Environment Agency fish survey (electric fishing) sites located within the Order Limits plus a 2km buffer. Data from between 2010 and 2021 was included in the desk study.
- 6.19.3.3 Fish survey data were included from all watercourses within the Order Limits and the 2km buffer, whether they were hydraulically connected to watercourses that interact with the project or not to provide context.
- 6.19.3.4 The Environment Agency survey species lists identified were screened for protected and/or notable fish species as defined in section 6.19.2: Methodology.

Field survey

Fish survey

- 6.19.3.5 A total of 22 electric fishing survey sites were screened based on habitat assessment, the route alignment and desk study information. The survey locations are shown in Table 2: Fish survey site locations and date(s) surveyed and ES Figure 6.17: Fish Habitat Assessment, Fish Survey and River Condition Survey (MoRPh). Surveys were completed by RSK Biocensus under the necessary Environment Agency SaFFA Section 27a exemption consent (Reference: EP/EW097-L-979/21412/01) required to undertake the fish surveys.
- 6.19.3.6 The exact survey extents were selected on the day of the surveys based on habitat features present and safe access. Survey reaches were representative of the watercourses and included habitats suitable for all age-classes of fish (i.e. riffles, glides, pools) where present.
- 6.19.3.7 Where site conditions permitted, fish population surveys were performed using a fully quantitative, catch depletion, electric fishing methodology. Given the size/width of the watercourses, the vast majority of sites were surveyed using Electrafish backpack equipment operating with one anode. Three sites on Trout Beck (WCP_08_DS, WCP_08_US and WCP_08_US_RED) were wider (~10m wetted width) and were therefore surveyed using Electrafish bankside equipment operating with two anodes. WCP_08_US-RED_KS and WCP_24_BLUE were surveyed using bankside equipment operating with one anode.
- 6.19.3.8 Fish populations were isolated by placing stop nets in the channel at the upstream and downstream survey extents. The survey reaches aimed to sample at least 100 m² of river habitat and incorporate all main mesohabitats. The reaches were fished in an upstream direction. Three survey runs were completed between the netted reaches to produce a population estimate in accordance with the

⁷ Environment Agency (2021) Ecology and Fish Data Explorer].

'Carle & Strub catch depletion method' (Carle & Strub,1978)⁸. Captured fish were transferred to holding containers filled with aerated river water. Fish were identified to species, enumerated, measured (fork length to the nearest millimetre), and released back to the same stretch of watercourse upon completion of the survey. Electric fishing was conducted by trained and experienced individuals following Environment Agency Operational Instruction guidance⁹.

- 6.19.3.9 Photographs of the habitat within the surveyed reaches and of the fish species captured at each site were taken.

Lamprey survey

- 6.19.3.10 Juvenile (ammocoete) lamprey surveys were undertaken at sites where suitable habitat was present. 1m² areas of fine sand or silt were surveyed using 2 minute on-off (20 second on, 5 seconds off) cycle draws with the anode positioned 10 –15 cm above the substrate in accordance with the methodology given in Natural England's publication *Monitoring the River, Brook and Sea Lamprey* (Harvey and Cowx, 2003)¹⁰. This was repeated three times to enable a population estimate by depletion analysis to be calculated. Captured ammocoetes were transferred to a holding container of river water and were measured before being released.

Habitat Data and Physico-chemical Parameters

- 6.19.3.11 A description of each site was recorded which included details such as the survey reach length, average width and depth and notable habitat features including macrophyte stands, presence of woody debris a substrate composition. Basic physico-chemical parameters including temperature, pH, dissolved oxygen concentration, salinity and conductivity were recorded using a hand-held YSI multi-parameter probe.

Biosecurity

- 6.19.3.12 The surveyors adhered to strict biosecurity protocols to prevent the threat of introducing disease, or the spread of Invasive Non-Native Species (INNS) between watercourses. There were known white-clawed crayfish populations associated with many of the western sites and the potential for presence of signal crayfish (*Pacifastacus leniusculus*) in the eastern sites. Therefore, the surveyors moved between the sites in a west to east direction to reduce the risk of spreading this particular INNS or pathogens associated with it.

⁸ Carle, F. L., & Strub, M. R. (1978) A New Method for Estimating Population Size from Removal Data. *Biometrics*, 34(4), 621–630..

⁹ Electric fishing in rivers, EA Operational instruction 144_03.

¹⁰ Harvey, J. & Cowx, I. (2003) *Monitoring the River, Brook and Sea Lamprey, Lampetra fluviatilis, L. planeri and Petromyzon marinus*. Conserving Natura 2000 Rivers Monitoring Series No. 5, English Nature, Peterborough.

Data analysis

- 6.19.3.13 Quantitative population density estimates were calculated for fish species captured at each survey location using the Carle & Strub maximum likelihood estimate of population size. This was calculated using Pisces Removal sampling 2 software. This analysis was not possible for all species captured, for example at some sites there were instances where only one individual of a species was captured, and therefore a population estimate could not be calculated. There were some instances where the software calculated a population estimate for a species but the Carle & Strub model was rejected by the chi-square goodness of fit test at a 20 % significance level. In these cases the population estimate has been provided but it has been noted if the model was rejected.
- 6.19.3.14 Juvenile lamprey population estimates were calculated using the data from the targeted lamprey surveys. These were calculated using the Pisces Removal sampling 2 software to obtain a Carle & Strub maximum likelihood estimate of population size. A population estimate was calculated for each 1m² targeted lamprey survey and these were summed to provide a total population estimate for the surveyed areas. A population density estimate was calculated by dividing the summed value by the number of targeted lamprey 1 m² areas surveyed at the site.
- 6.19.3.15 Bullhead population density estimates were calculated using the catch data from one run within the electric fishing survey at each location. This is following CSM guidance (Joint Nature Conservation Committee, 2015)¹¹ and based on research demonstrating that bullhead catches do not level off with repeated depletion sampling (Yeomans et al., 2008)¹². The run used was the one that contained the most bullheads. The minimum population density estimates for bullhead were calculated by dividing the bullhead abundance (from one electric fishing run) by the area of watercourse fished.

eDNA

- 6.19.3.16 Environmental DNA (eDNA) was collected from river water samples to determine the presence of fish species at each site. eDNA sampling procedure was consistent with followed NatureMetrics Aquatic eDNA - manual filtration sampling protocol. Samples were collected on a single occasion in September 2021 and sent to Nature Metrics Ltd. for laboratory analysis; 400ml of river water was filtered on site to obtain a sample.
- 6.19.3.17 DNA from each filter was extracted in the laboratory using a commercial DNA extraction kit with a protocol modified to increase DNA yields. An extraction blank was also processed for the extraction

¹¹ Joint Nature Conservation Committee (2015) Common Standards Monitoring Guidance for Freshwater Fauna (v. October 2015).

¹² Yeomans, W.E., Murray, D.S., Stevenson, C., McGillivray, C., McColl, D., Dodd, J.A., and Thomas, R. (2008) *Monitoring of Bullhead in Welsh SAC rivers - Rivers Usk and Wye.*

batch. DNA was purified to remove polymerase chain reaction (PCR)¹³ inhibitors using a commercial purification kit.

- 6.19.3.18 DNA yields were as expected, and the DNA was tested with a 16S bacterial PCR to determine the presence of PCR inhibitors and/or DNA degradation in the samples. The samples successfully amplified, indicating no inhibition or degradation.
- 6.19.3.19 Purified DNAs were amplified with PCR for a hypervariable region of the 12S rRNA gene to target vertebrates as part of the "vertebrates" eDNA metabarcoding analysis; this analysis is considered to be very effective in determining the presence of fish. Nature Metrics standard analysis includes 12 replicate PCRs per sample.
- 6.19.3.20 All PCRs were performed in the presence of both a negative control and a positive control sample (a mock community with a known composition). Amplification success was determined by gel electrophoresis.

Screening for protected and/or notable species

- 6.19.3.21 Fish species identified in the desk study and during the project-specific surveys (electric fishing and eDNA) were screened for protected and/or notable species as defined in section 6.19.2: Legislation and policy framework.

6.19.4 Assumptions and Limitations

Dry sites

- 6.19.4.1 There were several sites that were dry or almost dry. Fully dry sites were WCP_23 and WCP_30. Almost dry sites were WCP_04 and WCP_24_BLUE.

Water conductivity

- 6.19.4.2 Upon the first visit to site WCP_08_US-RED_KS, the conductivity levels were too high for the backpack electric fishing equipment to operate in. This site was later revisited in September 2021 and bankside electric fishing equipment was used instead to ensure sufficient voltage was available to stun fish.

Access

- 6.19.4.3 Site WCP_30_DS could not be accessed due to the presence of suckler cows, the landowner informed the surveyors that the channel was mostly dry at this site.
- 6.19.4.4 At sites WCP_18 and WCP_08_US-RED_KS, the channel was choked with vegetation and therefore access to a 100m or 50m reach of continuous, unobstructed channel could not be achieved. For these

¹³ Polymerase chain reaction is a process by which millions of copies of a particular DNA segment are produced through a series of heating and cooling steps, known as an 'amplification' process. One of the most common processes in molecular biology and a precursor to most sequencing-based analyses.

sites, a presence/absence survey was carried out instead by undertaking point abundance sampling within the accessible regions of the channel.

Table 2: Fish survey site locations and date(s) surveyed

Scheme	Site name	Watercourse	Survey location (National Grid Reference)		Dates sampled
			Upstream	Downstream	
M6 Junction 40 to Kemplay Bank (S0102)	WCP_01	Thacka Beck	NY 5270629224	NY 5278729183	18/08/2021
Penrith to Temple Sowerby (S03)	WCP_03	Light Water	NY 5503929310	NY 5513329338	16/08/2021
	WCP_04	Unnamed Tributary of River Eamont 3.3	NY 5563229083	NY 5565029182	16/08/2021
Temple Sowerby to Appleby (S0405)	WCP_08_US	Trout Beck	NY 6471924430	NY 6463524482	17/08/2021
	WCP_08_DS	Trout Beck	NY 6504824523	NY 6496724470	17/08/2021
	WCP_08_US-RED_KS	Keld Sike	NY 6528324581	NY 6518724561	17/08/2021 & 23/09/2021
	WCP_08_US-RED	Trout Beck	NY 6574124130	NY 6566024180	18/08/2021
Appleby to Brough (S06)	WCP_11	Unnamed Tributary of Mire Sike 6.12	NY 7352016860	NY 7346616792	19/08/2021
	WCP_13	Cringle Beck	NY 7447016541	NY 7443916442	19/08/2021
	WCP_15	Moor Beck	NY 7504116116	NY 7503516035	19/08/2021
	WCP_16	Moor Beck	NY 7505715959	NY 7514615915	20/08/2021
	WCP_17	Eastfield Sike	NY 7547915813	NY 7545315774	23/08/2021
	WCP_18	Unnamed Tributary of Lowgill Beck 6.1	NY 7734715187	NY 7725615112	23/08/2021
	WCP_19	Lowgill Beck	NY 7802115025	NY 7792914989	24/08/2021
	WCP_19_US_YS	Yosgill Sike	NY 7839315189 (eDNA only)		03/09/2021
	WCP_19_US_WS	Woodend Sike	NY 7834015202 (eDNA only)		03/09/2021
Bowes Bypass (S07)	WCP_20	Unnamed Tributary of River Greta 7.3	NZ 0001813420 (electric fishing only)	NZ 0003413327 (electric fishing only)	24/08/2021

Scheme	Site name	Watercourse	Survey location (National Grid Reference)		Dates sampled
			Upstream	Downstream	
Cross Lanes to Rokeby (S08)	WCP_23	Unnamed Tributary of Tutta Beck 8.1	N/A (site dry)		24/08/2021
	WCP_24	Tutta Beck	NZ 0534913685	NZ 0544913681	25/08/2021
	WCP_24_ BLUE	Punder Gill	NZ 0445613690	NZ 0454613670	24/09/2021
Stephen Bank to Carkin Moor (S09)	WCP_28	Unnamed Tributary of Holme Beck 9.6	NZ 1435709420 (eDNA only)		15/09/2021
	WCP_30	Mains Gill	NZ 1568708633 (eDNA only)		25/08/2021
	WCP_30_ DS	Mains Gill	N/A (no access for site)		25/08/2021
	WCP_33	Unnamed Tributary of Holme Beck 9.2	NZ 1620607952	NZ 1614907883	25/08/2021

6.19.5 Results

Desk Study

- 6.19.5.1 Table 3: Fish records of conservation value within the Order Limits plus a 2km buffer. (ERT) denotes Eden Rivers Trust data shows the fish species of conservation value identified within the desk study search area; this includes records identified from Environment Agency (2010-2021) and Eden River Trust (2002-2018) fish monitoring.
- 6.19.5.2 Fish species of conservation value were identified within the desk study search area for all schemes, with the exception of the A1 (M) Junction 53 Scotch Corner scheme. This included the following species of conservation value: Atlantic salmon (*Salmo salar*) (referred to hereafter as salmon), European bullhead (*Cottus gobio*) (referred to hereafter as bullhead), brown trout (*Salmo trutta*), European eel (*Anguilla anguilla*) (referred to hereafter as eel) and river or brook lamprey (*Lampetra fluviatili* / *Lampetra planeri*).

Table 3: Fish records of conservation value within the Order Limits plus a 2km buffer. (ERT) denotes Eden Rivers Trust data

Scheme	Watercourse & EA site ID	Approximate distance and direction from the Order Limits	Atlantic salmon	Bullhead	Lamprey sp.	Eel	Brown trout / sea trout	Grayling
M6 Junction 40 to Kemplay Bank (S0102)	River Eamont (11141)	3m south	✓	✓		✓	✓	
	River Eamont (10372)	6m south	✓	✓	✓	✓	✓	✓
	River Eamont (6465)	19m south west	✓	✓	✓	✓	✓	
	River Eamont (6468)	81m	✓	✓	✓	✓	✓	
	River Eamont (6466)	174m south west	✓	✓		✓	✓	
	River Eamont (10371)	230m east	✓	✓	✓	✓	✓	✓
	River Lowther (10976)	316m south	✓	✓		✓	✓	
	River Eamont (10370)	1.2km south west	✓	✓	✓	✓	✓	
Penrith to Temple Sowerby (S03)	River Eamont (28824)	337m north east	✓	✓		✓	✓	
	River Eamont (10372)	888m west	✓	✓	✓	✓	✓	✓

Scheme	Watercourse & EA site ID	Approximate distance and direction from the Order Limits	Atlantic salmon	Bullhead	Lamprey sp.	Eel	Brown trout / sea trout	Grayling
	River Eamont (11141)	1.0km west	✓	✓		✓	✓	
	River Eamont (10371)	1.2km west	✓	✓	✓	✓	✓	✓
	Crowdundle Beck (5260)	1.3km east	✓	✓	✓	✓	✓	✓
	River Lowther (10976)	1.6km west	✓	✓		✓	✓	
	River Eamont (6465)	1.7km west	✓	✓	✓	✓	✓	
	River Eamont (6468)	1.8km west	✓	✓	✓	✓	✓	
	River Eden (28883)	2.0km south east	✓	✓		✓	✓	
Temple Sowerby to Appleby (S0405)	Trout Beck (5234)	12m south	✓	✓	✓	✓	✓	
	Trout Beck (5233)	36m east	✓	✓		✓	✓	
	River Eden (28883)	299m west	✓	✓		✓	✓	
	Crowdundle Beck (5260)	1.2km north	✓	✓	✓	✓	✓	✓
	River Lyvennet (5223)	1.5km south west	✓	✓		✓	✓	

Scheme	Watercourse & EA site ID	Approximate distance and direction from the Order Limits	Atlantic salmon	Bullhead	Lamprey sp.	Eel	Brown trout / sea trout	Grayling
	Trout Beck (71923)	1.5km north east	✓	✓			✓	
	Trout Beck (71924)	1.6km north east	✓	✓			✓	
	Hoff Beck (5315)	1.6km south	✓	✓		✓	✓	
	Trout Beck (71925)	1.7km north east	✓	✓			✓	
	Trout Beck (71926)	1.7km north east	✓	✓	✓	✓	✓	
	Trout Beck (5317)	1.8km north east	✓	✓	✓	✓	✓	
	Trout Beck (71928)	1.8km north east	✓				✓	
	Trout Beck (71927)	1.8km north east	✓	✓	✓		✓	
Appleby to Brough (S06)	Hayber Beck (ERT)	5m north	✓				✓	
	Moor Beck (5357)	5m south	✓	✓			✓	
	Lowgill Beck (5361)	11m south	✓			✓	✓	
	River Eden (5273)	676m south west	✓	✓				

Scheme	Watercourse & EA site ID	Approximate distance and direction from the Order Limits	Atlantic salmon	Bullhead	Lamprey sp.	Eel	Brown trout / sea trout	Grayling
	Swindale Beck (5296)	684m east	✓	✓			✓	
	George Gill (5366)	787m north west	✓	✓		✓	✓	
	River Eden (52544)	813m south	✓	✓		✓	✓	
	Swindale Beck (44021)	861m south	✓	✓		✓	✓	
	Augill Beck (17185)	1.2km south east	✓	✓		✓	✓	
	Helm Beck (5303)	1.8km south west	✓	✓		✓	✓	✓
Bowes Bypass (S07)	River Greta (15059)	300m south	✓	✓			✓	
	River Greta (15060)	1.7km west	✓	✓				
Cross Lanes to Rokeby (S08)	River Greta (14655)	252m south	✓	✓			✓	
	Thorsgill Beck (13766)	1.0km north east		✓				
	River Tees (3442)	1.1km north	✓	✓		✓	✓	✓
	Thorsgill Beck (13765)	1.3km north		✓			✓	

Scheme	Watercourse & EA site ID	Approximate distance and direction from the Order Limits	Atlantic salmon	Bullhead	Lamprey sp.	Eel	Brown trout / sea trout	Grayling
	River Greta (14656)	1.6km south west	✓	✓			✓	
Stephen Bank to Carkin Moor (S09)	Dalton Beck (68643)	1.8km south		✓			✓	

Field Survey

Routewide

- 6.19.5.3 Fish were caught at 12 sites and included the following species: salmon, bullhead, brown trout, eel, minnow (*Phoxinus phoxinus*), river/brook lamprey, stone loach (*Barbatula barbatula*) and three-spined stickleback (*Gasterosteus aculeatus*).
- 6.19.5.4 Gudgeon (*Gobio gobio*) was also identified at one site (WCP_15 in Moor Beck) via eDNA analysis.
- 6.19.5.5 A summary of the fish species and number of individuals captured during electric fish surveys and eDNA derived presence/absence for each site is presented in Table 4: Summary of the electric fishing and the eDNA survey results. A summary of the physico-chemical parameters for each site is presented in Table 5: Physico-chemical readings for each survey location.
- 6.19.5.6 White-clawed crayfish (*Austropotamobius pallipes*) were recorded during electric fishing surveys at three sites. These records, along with specific crayfish survey results and eDNA records of white-clawed crayfish, are described in the White-clawed Crayfish Technical Appendix (ES Appendix 6.22: White Clawed Crayfish (Application Document 3.4) and are not discussed in detail in this report.
- 6.19.5.7 White-clawed crayfish caught during electric fishing surveys were kept in a holding container of river water and returned to the same area of watercourse when the final electric fishing run was completed to minimise exposure to electric current. The presence of white-clawed crayfish was reported to the Amey-Arup project team at the earliest opportunity.

Table 4: Summary of the electric fishing and the eDNA survey results

Scheme	Site name	Watercourse	Species	Number of fish caught ¹⁴	eDNA ¹⁵
M6 Junction 40 to Kemplay Bank (S0102)	WCP_01	Thacka Beck	Bullhead	x	x
			Brown trout	x	x
			Eel	1	✓
			Gudgeon	x	x
			Lamprey sp.	x	x
			Minnow	x	✓
			Salmon	1	x
			Stone loach	7	✓
			Three-spined stickleback	x	x
Penrith to Temple	WCP_03	Light Water	Bullhead	x	x
			Brown trout	x	✓

¹⁴ x = "not caught during electric fishing survey"

¹⁵ x = "no eDNA present in sample", ✓ = "eDNA present in sample"

Scheme	Site name	Watercourse	Species	Number of fish caught ¹⁴	eDNA ¹⁵
Sowerby (S03)			Eel	2	✓
			Gudgeon	x	x
			Lamprey sp.	x	x
			Minnow	38	✓
			Salmon	x	✓
			Stone loach	2	x
			Three-spined stickleback	x	✓
Penrith to Temple Sowerby (S03)	WCP_04	Unnamed Tributary of River Eamont 3.3	Bullhead	x	x
			Brown trout	x	x
			Eel	x	x
			Gudgeon	x	x
			Lamprey sp.	x	x
			Minnow	x	✓
			Salmon	x	x
			Stone loach		✓
			Three-spined stickleback	x	x
Temple Sowerby to Appleby (S0405)	WCP_08_DS	Trout Beck	Bullhead	35	✓
			Brown trout	29	✓
			Eel	6	✓
			Gudgeon	x	x
			Lamprey sp.	✓	✓
			Minnow	49	✓
			River / brook lamprey (ammocete)	5	✓
			River / brook lamprey (transformer)	1	✓
			Salmon	31	✓
			Stone loach	4	✓
			Three-spined stickleback	7	✓
Temple Sowerby to Appleby (S0405)	WCP_08_US	Trout Beck	Bullhead	8	✓
			Brown trout	21	✓
			Eel	x	✓
			Gudgeon	x	x
			Lamprey sp.	x	✓
			Minnow	9	✓
			Salmon	18	✓
			Stone loach	x	✓
Three-spined stickleback	1	✓			

Scheme	Site name	Watercourse	Species	Number of fish caught ¹⁴	eDNA ¹⁵
Temple Sowerby to Appleby (S0405)	WCP_08_US-RED_KS (August visit)	Keld Sike	Bullhead	x	✓
			Brown trout	x	✓
			Eel	x	✓
			Gudgeon	x	x
			Lamprey sp.	x	x
			Minnow	x	✓
			Salmon	x	x
			Stone loach	x	x
			Three-spined stickleback	x	✓
Temple Sowerby to Appleby (S0405)	WCP_08_US-RED	Trout Beck	Bullhead	26	✓
			Brown trout	65	✓
			Eel	1	✓
			Gudgeon	x	x
			Lamprey sp.	✓	✓
			Minnow	15	✓
			River / brook lamprey (ammocete)	50	✓
			River / brook lamprey (transformer)	1	✓
			Salmon	55	✓
			Stone loach	12	✓
			Three-spined stickleback	22	✓
Appleby to Brough (S06)	WCP_11	Unnamed Tributary of Mire Sike 6.12	Bullhead	4	✓
			Brown trout	x	x
			Eel	1	✓
			Gudgeon	x	x
			Lamprey sp.	x	x
			Minnow	129	✓
			Salmon	x	x
			Stone loach	13	✓
			Three-spined stickleback	x	✓
Appleby to Brough (S06)	WCP_13	Cringle Beck	Bullhead	x	✓
			Brown trout	1	x
			Eel	x	x
			Gudgeon	x	x
			Lamprey sp.	x	x
			Minnow	20	✓
			Salmon	1	x

Scheme	Site name	Watercourse	Species	Number of fish caught ¹⁴	eDNA ¹⁵
			Stone loach	x	x
			Three-spined stickleback	34	✓
Appleby to Brough (S06)	WCP_15	Moor Beck	Bullhead	50	✓
			Brown trout	85	✓
			Eel	2	✓
			Gudgeon	x	✓
			Lamprey sp.	✓	✓
			Minnow	x	✓
			River / brook lamprey (ammocete)	9	✓
			River / brook lamprey (transformer)	1	✓
			Salmon	7	✓
			Stone loach	x	x
			Three-spined stickleback	2	✓
Appleby to Brough (S06)	WCP_16	Moor Beck	Bullhead	26	✓
			Brown trout	23	✓
			Eel	1	✓
			Gudgeon	x	x
			Lamprey sp.	✓	✓
			Minnow	x	x
			River / brook lamprey (ammocete)	7	✓
			Salmon	14	✓
			Stone loach	x	x
			Three-spined stickleback	x	✓
			Appleby to Brough (S06)	WCP_17	Eastfield Sike
Brown trout	14	✓			
Eel	x	✓			
Gudgeon	x	x			
Lamprey sp.		✓			
Minnow	59	✓			
River / brook lamprey (ammocete)	7	✓			
River / brook lamprey (transformer)	1	✓			
Salmon	x	✓			
Stone loach	4	✓			
Three-spined stickleback	73	✓			

Scheme	Site name	Watercourse	Species	Number of fish caught ¹⁴	eDNA ¹⁵
Appleby to Brough (S06)	WCP_18	Unnamed Tributary of Lowgill Beck 6.1	Bullhead	x	x
			Brown trout	x	x
			Eel	x	✓
			Gudgeon	x	x
			Lamprey sp.	x	x
			Minnow	x	x
			Salmon	x	x
			Stone loach	x	x
			Three-spined stickleback	x	✓
Appleby to Brough (S06)	WCP_19	Lowgill Beck	Bullhead	9	✓
			Brown trout	x	✓
			Eel	x	x
			Gudgeon	x	x
			Lamprey sp.	✓	✓
			Minnow	76	✓
			River / brook lamprey (ammocete)	1	✓
			River / brook lamprey (transformer)	9	✓
			Salmon	x	x
			Stone loach	17	✓
			Three-spined stickleback	102	✓
Appleby to Brough (S06)	WCP_19_US_YS	Yosgill Sike	Bullhead	eDNA only	✓
			Brown trout		✓
			Eel		✓
			Gudgeon		x
			Lamprey sp.		x
			Minnow		✓
			Salmon		x
			Stone loach		✓
			Three-spined stickleback		x
Appleby to Brough (S06)	WCP_19_US_WS	Woodend Sike	Bullhead	eDNA only	✓
			Brown trout		✓
			Eel		✓
			Gudgeon		x
			Lamprey sp.		x
			Minnow		✓
			Salmon		x

Scheme	Site name	Watercourse	Species	Number of fish caught ¹⁴	eDNA ¹⁵
			Stone loach		✓
			Three-spined stickleback		✓
Cross Lanes to Rokeby (S08)	WCP_23	Unnamed Tributary of Tutta Beck 8.1	n/a	No catch – site dry	No sample – site dry
Cross Lanes to Rokeby (S08)	WCP_24	Tutta Beck	Bullhead	x	✓
			Brown trout	3	x
			Eel	x	x
			Gudgeon	x	x
			Lamprey sp.	x	x
			Minnow	x	x
			Salmon	x	x
			Stone loach	x	x
			Three-spined stickleback	x	x
Cross Lanes to Rokeby (S08)	WCP_24_B LUE	Punder Gill	No catch		No fish species identified
Stephen Bank to Carkin Moor (S09)	WCP_28	Unnamed Tributary of Holme Beck 9.6	eDNA only		No fish species identified
Stephen Bank to Carkin Moor (S09)	WCP_30	Mains Gill	Bullhead	x	x
			Brown trout	x	x
			Eel	x	x
			Gudgeon	x	x
			Lamprey sp.	x	x
			Minnow	x	x
			Salmon	x	x
			Stone loach	x	x
			Three-spined stickleback	x	✓
Stephen Bank to Carkin Moor (S09)	WCP_30_DS	Mains Gill	No access		No eDNA sample
Stephen Bank to Carkin Moor (S09)	WCP_33		Bullhead	x	✓
			Brown trout	x	x
			Eel	x	x
			Gudgeon	x	x
			Lamprey sp.	x	x

Scheme	Site name	Watercourse	Species	Number of fish caught ¹⁴	eDNA ¹⁵
			Minnow	x	x
			Salmon	x	x
			Stone loach	x	x
			Three-spined stickleback	x	x

Table 5: Physico-chemical readings for each survey location

Site name	Temp (°C)	Dissolved oxygen (%)	Dissolved oxygen (mg/l)	pH	Specific conductance (µs/cm)	Salinity (ppt)
WCP_01	15.9	95.9	9.44	8.45	1,927.0	0.99
WCP_03	11.3	73.1	8.06	7.13	338.0	0.16
WCP_04	14.6	43.3	4.34	7.30	379.3	0.18
WCP_08_US	12.8	87.0	9.22	7.80	632.0	0.31
WCP_08_DS	13.5	94.2	9.83	8.07	377.2	0.18
WCP_08_US-RED_KS (Aug)	12.5	81.8	8.63	8.23	2,122.0	1.09
WCP_08_US-RED_KS (Sep)	11.7	91.2	9.80	8.24	1,767.0	0.90
WCP_08_US-RED	12.9	82.6	8.67	7.82	336.2	0.16
WCP_11	14.1	74.7	7.68	7.96	571.0	0.28
WCP_13	14.6	70	7.08	8.32	227.6	0.11
WCP_15	12.9	85.7	9.04	8.39	260.9	0.13
WCP_16	12.1	84.1	9.04	8.07	269.6	0.13
WCP_17	14.7	92.7	9.37	8.20	266.0	0.13
WCP_18	14.9	80.1	8.06	7.67	394.0	0.19
WCP_19	14.0	81.9	8.42	8.08	319.5	0.15
WCP_19_US_Y S	No data - eDNA sample only					
WCP_19_US_WS	No data - eDNA sample only					
WCP_20	15.7	52.0	5.15	7.54	810.0	0.40
WCP_23	No data - site dry					
WCP_24	15.2	74.9	7.45	8.04	597.0	0.29
WCP_24_BLUE	12.4	82.9	8.83	8.15	520.0	0.26
WCP_28	No data - eDNA sample only					
WCP_30	No data - site dry					
WCP_30_DS	No data - no access					
WCP_33	14.1	83.0	8.51	8.00	848.0	0.42

M6 Junction 40 to Kemplay Bank

WCP_01 (Thacka Beck)

- 6.19.5.8 A 90m quantitative electric fishing survey, comprised of three runs, was undertaken at site WCP_01. The survey area was 180m². The average width of the channel was 2.00 m, the average depth was 0.15 m and the maximum depth was 0.20 m. The bed substrate was predominantly cobble and gravel / coarse sand. The flow type was predominantly shallow glide/run. Submerged vegetation, coarse substrate and overhangs provided potential sources of cover for fish. Filamentous and non-filamentous algae was present.
- 6.19.5.9 A targeted juvenile lamprey survey was not undertaken at this site due to an absence of suitable habitat.
- 6.19.5.10 A total of nine fish were caught at this site during the electric fishing survey. Species population estimates, densities and average length are presented in Table 6: Number of fish captured at WCP_01, population estimates, population density per m² and average (mean) fork lengths.. A population estimate for eel and salmon could not be calculated as only one of each of these species was captured. A species composition chart and length frequency histogram are presented in Plate 1: WCP_01: Species composition and length frequency histogram for stone loach.
- 6.19.5.11 The eDNA survey also identified the presence of minnow at this site (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 6: Number of fish captured at WCP_01, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Eel	1	n/a	n/a	250
Salmon	1	n/a	n/a	58
Stone loach	7	8	0.04	84

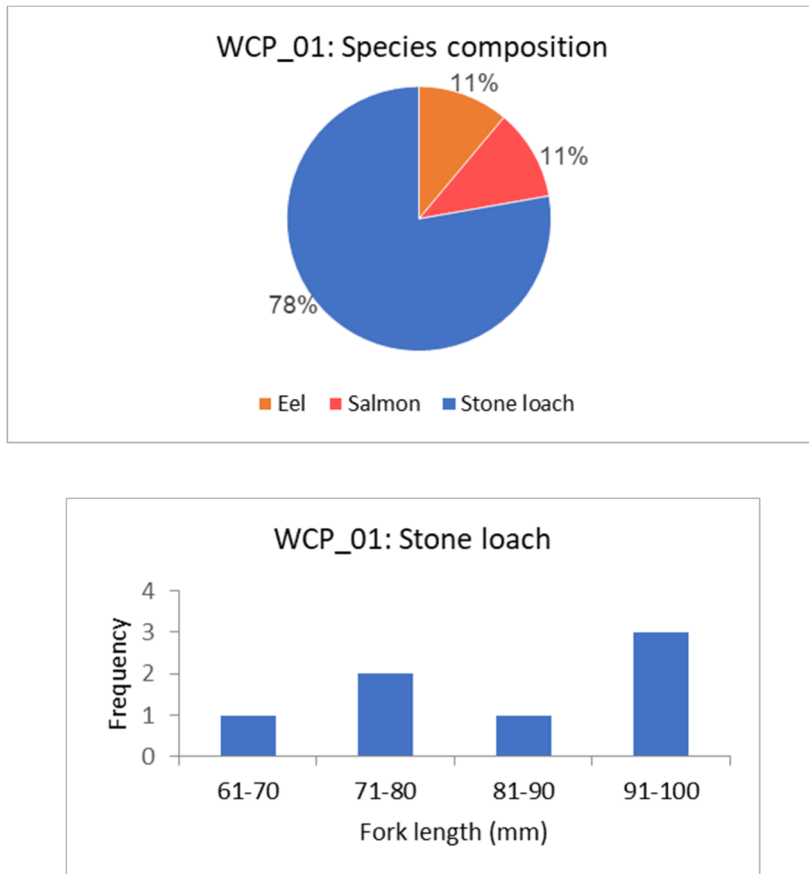


Plate 1: WCP_01: Species composition and length frequency histogram for stone loach

Penrith to Temple Sowerby

WCP_03 (Light Water)

- 6.19.5.12 A 100 m quantitative electric fishing survey, comprised of four runs, was undertaken at site WCP_03. The battery output in the fishing equipment was not operating correctly during the first run, so the surveyors changed the battery and completed four runs at this site to ensure a population depletion was obtained. The survey area was 150m². The average width of the channel was 1.50m, the average depth was 0.20m and the maximum depth was 0.80m. The bed substrate was mostly comprised of cobbles, gravel / coarse sand and fine sand / silt. The flow type was shallow glide/ un. Submerged vegetation provided a potential source of cover for fish. Filamentous and non-filamentous algae was present.
- 6.19.5.13 A targeted juvenile lamprey survey was not undertaken at this site due to an absence of suitable habitat.
- 6.19.5.14 A total of 42 fish were caught at this site caught at this site during the electric fishing survey. Species population estimates, densities and average length are presented in Table 7: Number of fish captured at WCP_03, population estimates, population density per m² and average (mean) fork lengths.. A species composition chart and length

frequency histograms are presented in Plate 2: WCP_03: Species composition and length frequency histograms.

6.19.5.15 The eDNA survey also identified the presence of the following additional species: brown trout, salmon and three-spined stickleback (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 7: Number of fish captured at WCP_03, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Eel	2	3	0.02	265
Minnow	38	39 ¹⁶	0.26	68
Stone loach	2	3	0.02	86

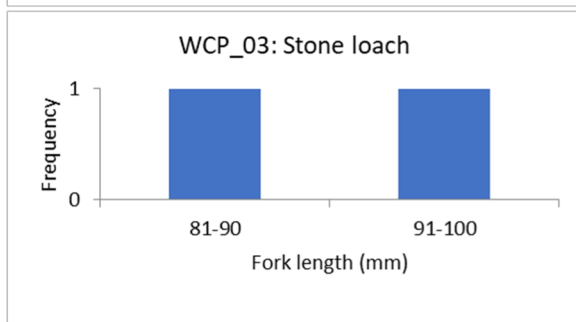
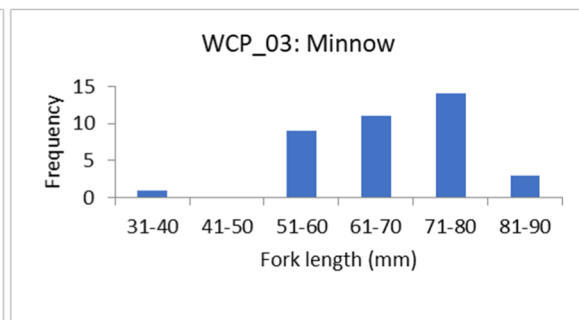
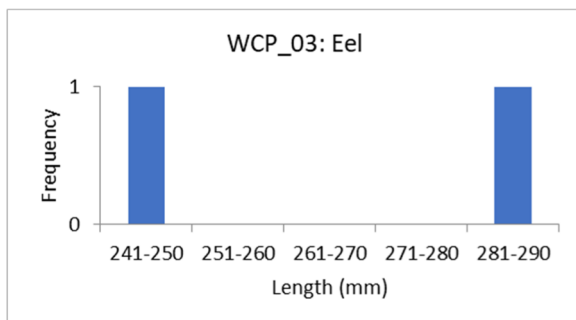
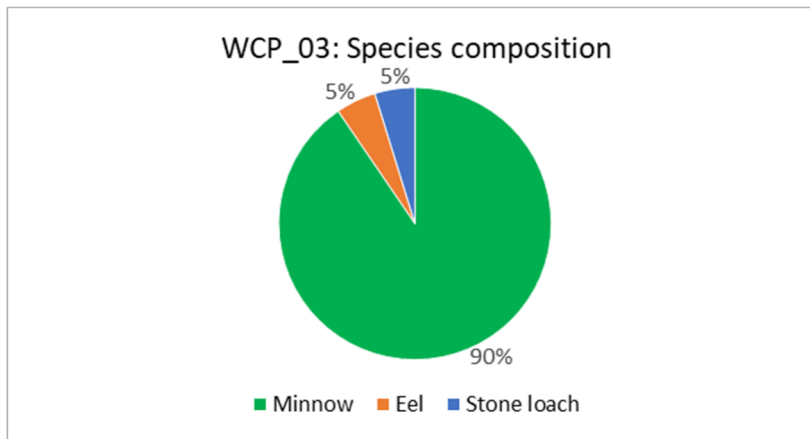


Plate 2: WCP_03: Species composition and length frequency histograms

¹⁶ Run 1 & 2 data combined for this population estimate

WCP_04 (Unnamed Tributary of River Eamont 3.3)

- 6.19.5.16 Site WCP_04 had several dry sections where grass was growing in the channel. The surveyors could not undertake a fish survey over a continuous reach of wetted channel. The surveyors undertook electric fishing in the wetted sections and remaining pools over a 100m reach. The average width of the channel was 0.75 m, the average depth was 0.15m and the maximum depth was 0.30 m.
- 6.19.5.17 No fish were captured at this site during electric fishing, however, the eDNA survey identified the presence of minnow and stone loach (Table 4: Summary of the electric fishing and the eDNA survey results).

Temple Sowerby to Appleby

WCP_08_DS (Trout Beck)

- 6.19.5.18 A 100 m quantitative electric fishing survey, comprised of three runs, was undertaken at site WCP_08_DS. The survey area was 812 m². The average width of the channel was 8.12 m, the average depth was 0.35 m and the maximum depth was 0.55 m. The bed substrate was mostly comprised of cobbles, gravel / coarse sand and some areas of fine sand / silt. The flow type comprised shallow glide / run with some sections of riffle. Submerged vegetation, coarse substrate, tree root systems and undercut banks provided potential sources of cover for fish.
- 6.19.5.19 Juvenile lamprey surveys were undertaken in four 1 m² sections of optimal habitat.
- 6.19.5.20 A total of 167 fish were caught at this site during the electric fishing survey. Species population estimates, densities and average length are presented in Table 8: Number of fish captured at WCP_08_DS, population estimates, population density per m² and average (mean) fork lengths.
- 6.19.5.21 One lamprey (transformer) was caught during the main electric fishing survey and five lamprey (ammocoetes) were caught during the targeted lamprey surveys. The lamprey population estimate has been calculated using the data from the targeted lamprey surveys. A population estimate could not be calculated for lamprey (transformer) due to low capture numbers.
- 6.19.5.22 A population estimate could not be calculated for eel and stone loach due to low capture numbers of these species at this site. A species composition chart and length frequency histograms are presented in Plate 3: WCP_08_DS: Species composition and length frequency histograms.
- 6.19.5.23 The eDNA survey also identified the presence of all the species recorded during electric fishing (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 8: Number of fish captured at WCP_08_DS, population estimates, population density per m² and average (mean) fork lengths

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Bullhead	35	N/A	0.02	78
Brown trout	29	30	0.10	169
Eel	6	N/A	N/A	299
Minnow	49	59	0.07	63
River / brook lamprey (ammocoete)	5	7	1.75	82
River / brook lamprey (transformer)	1	N/A	N/A	134
Salmon	31	39	0.05	80
Stone loach	4	N/A	N/A	78
Three-spined stickleback	7	8	0.01	30

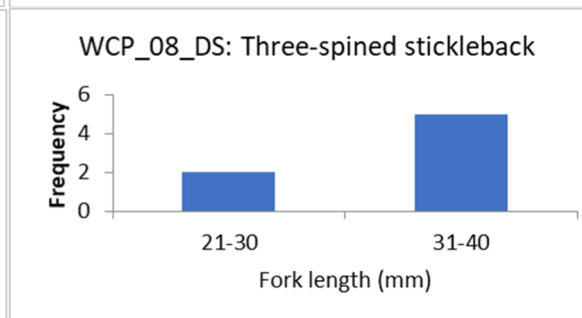
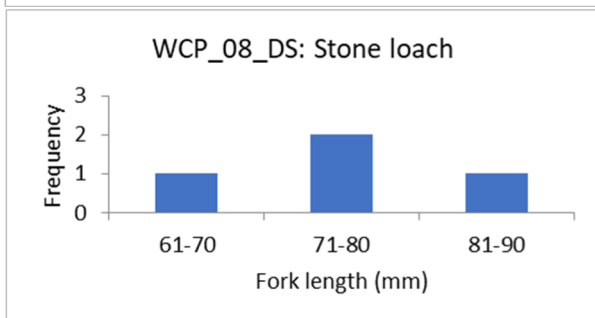
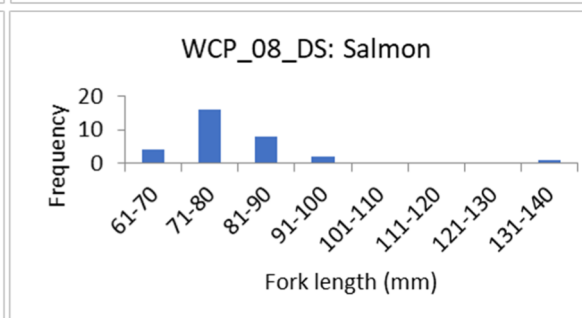
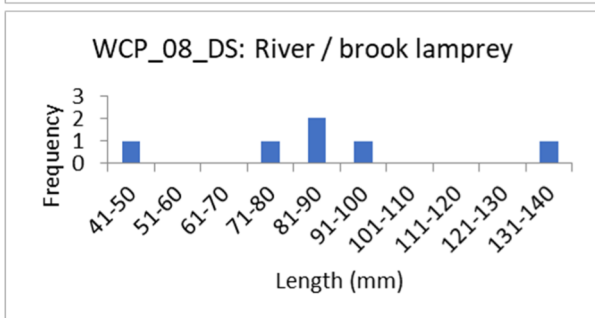
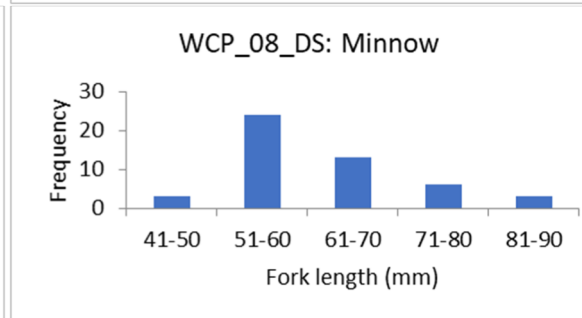
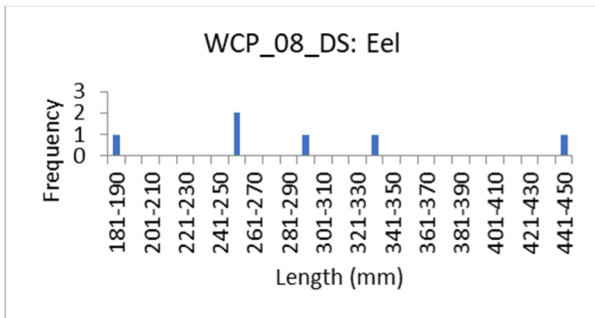
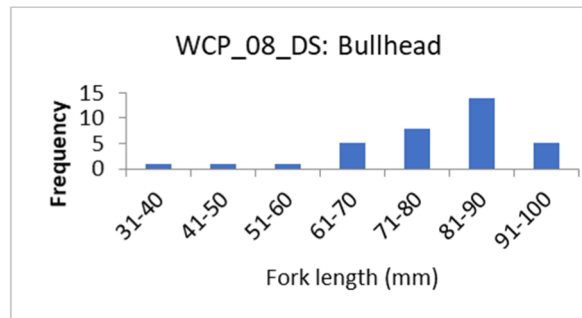
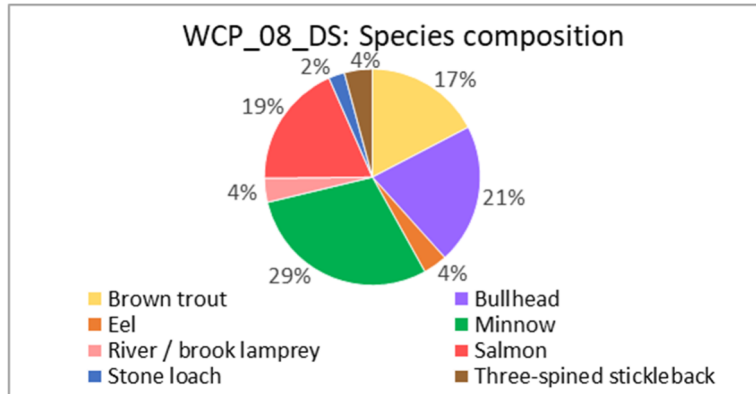


Plate 3: WCP_08_DS: Species composition and length frequency histograms

WCP_08_US (Trout Beck)

- 6.19.5.24 A 100 m quantitative electric fishing survey, comprised of three runs, was undertaken at site WCP_08_US. The survey area was 900 m². The average width of the channel was 9.00m, the average depth was 0.20 m, and the maximum depth was 0.60m. The bed substrate was mostly comprised of boulder, cobbles, gravel / coarse sand and some areas of fine sand/silt. The main flow type was shallow glide / run with some sections of riffle. Coarse substrate, tree root systems and woody debris provided potential sources of cover for fish.
- 6.19.5.25 Juvenile lamprey surveys were undertaken in four 1 m² sections of optimal habitat. No lamprey were caught during the main electric fishing survey or during the targeted lamprey surveys.
- 6.19.5.26 A total of 57 fish were caught at this site during the electric fishing surveys. Species population estimates, densities and average length are presented in Table 9: Number of fish captured at WCP_08_US, population estimates, population density per m² and average (mean) fork lengths.. A population estimate could not be calculated for minnow due to insufficient capture depletion or for three-spined stickleback due to only one individual being captured.
- 6.19.5.27 A species composition chart and length frequency histograms are presented in Plate 4: WCP_08_US: Species composition and length frequency histograms..
- 6.19.5.28 The eDNA survey also identified the presence of the following additional species: eel, lamprey sp. and stone loach (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 9: Number of fish captured at WCP_08_US, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Bullhead	8	N/A	0.004	79
Brown trout	21	22	0.02	155
Minnow	9	N/A	N/A	66
Salmon	18	22	0.02	91
Three-spined stickleback	1	N/A	N/A	22

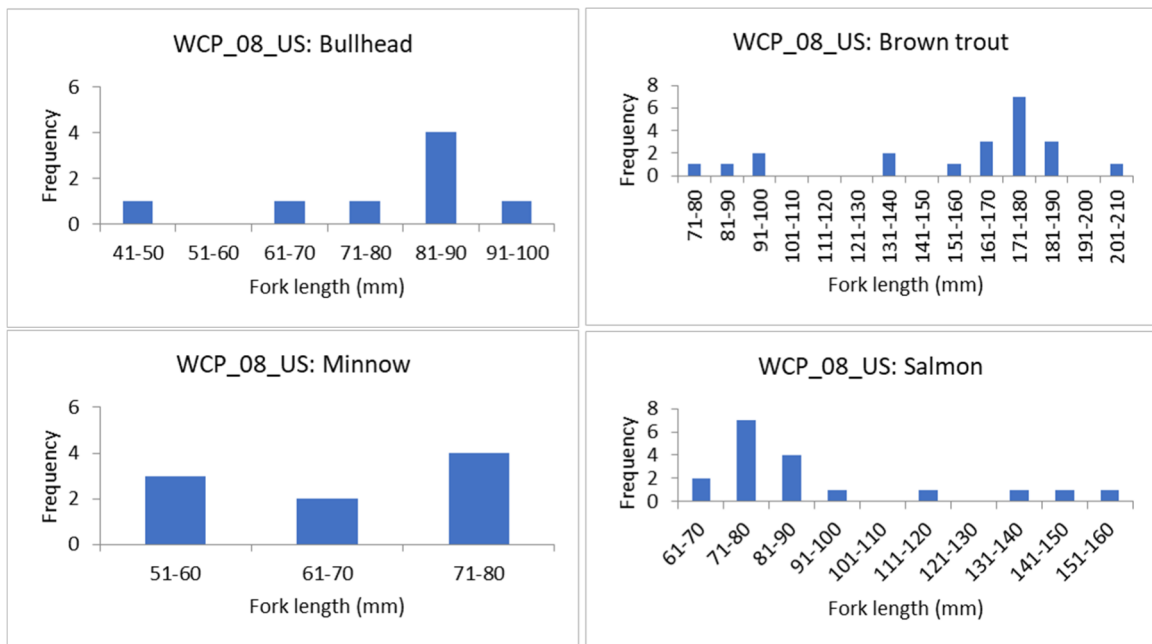
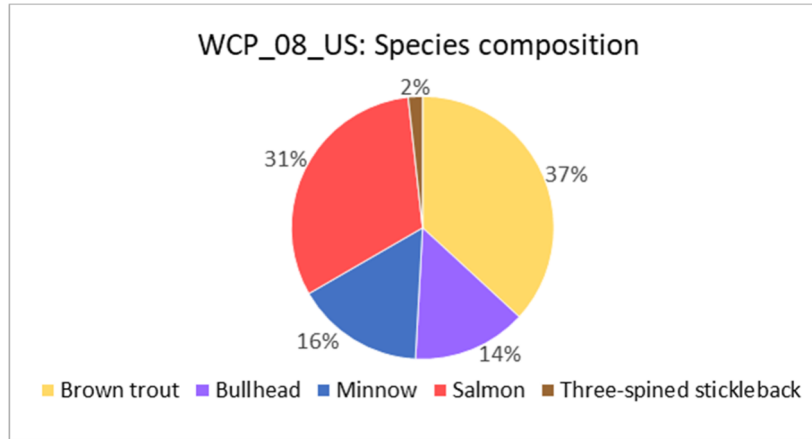


Plate 4: WCP_08_US: Species composition and length frequency histograms.

WCP_08_US-RED_KS (Keld Sike)

6.19.5.29 Site WCP_08_US-RED_KS was visited on two occasions. On the first visit, the specific conductivity was recorded as 2,122.0µs/cm. This reading was too high for the backpack electric fishing equipment to operate in. The surveyors decided to leave the site and return with the bankside equipment at a later date subject to approval from the landowner. It was agreed that the surveyors could revisit and this site was surveyed in September 2021 using bankside electric fishing equipment which can operate in a wider range of conductivity values. The specific conductivity on the second visit was recorded as 1,767.0µs/cm. The site was choked with vegetation and the surveyors could not carry out an electric fishing survey for a continuous 100 m run. Instead, a presence / absence survey was carried out by electric fishing in the accessible sections of the channel. The survey was carried out over a 100m reach. The average width of the channel was 0.50m, the average depth was 0.15m and the maximum depth was

0.40m. The bed substrate was mostly comprised of cobbles, gravel / coarse sand and fine sand / silt. The main flow type was shallow glide / run. Coarse substrate and overhangs provided potential sources of cover for fish.

- 6.19.5.30 A targeted juvenile lamprey survey was not undertaken at this site due to an absence of suitable habitat. No fish were captured at this site during electric fishing.
- 6.19.5.31 Despite no fish being recorded during electric fishing, the eDNA survey identified the presence of the following species: eel, minnow, three-spined stickleback, trout and bullhead (Table 4: Summary of the electric fishing and the eDNA survey results).

WCP_08_US-RED (Trout Beck)

- 6.19.5.32 A 100 m quantitative electric fishing survey, comprised of three runs, was undertaken at site WCP_08_US-RED. The survey area was 1100 m². The average width of the channel was 11.00 m, the average depth was 0.30 m, and the maximum depth was 0.70 m. The bed substrate was mostly comprised of cobbles and gravel / coarse sand. Boulders and some sections of fine sand / silt were present. The main flow type was shallow glide / run with some sections of riffle. Coarse substrate, submerged vegetation, tree root systems, undercut banks and overhang provided potential sources of cover for fish. Filamentous and non-filamentous algae was present.
- 6.19.5.33 Juvenile lamprey surveys were undertaken in two 1m² sections of optimal and two 1 m² sections of sub-optimal habitat.
- 6.19.5.34 A total of 247 fish were caught at site during the electric fishing surveys. Species population estimates, densities and average length are presented in Table 10: Number of fish captured at WCP_08_US-RED, population estimates, population density per m² and average (mean) fork lengths..
- 6.19.5.35 A total of 21 lamprey (ammocoetes) were caught during the main electric fishing survey and a total of 30 (29 ammocoetes and 1 transformer) were caught during the targeted lamprey surveys. A population estimate could not be calculated for lamprey (transformer) due to low capture numbers. A population estimate could not be calculated for eel as only one eel was caught at this site. A species composition chart and length frequency histograms are presented in Plate 5: WCP_08_US-RED: Species composition and length frequency histograms.
- 6.19.5.36 The eDNA survey also identified the presence of all the species recorded during electric fishing (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 10: Number of fish captured at WCP_08_US-RED, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Bullhead	26	N/A	0.01	73
Brown trout	65	74	0.07	113
Eel	1	N/A	N/A	510
Minnow	15	16	0.01	71
River / brook lamprey (ammocoete)	50	37 ¹⁷	9.25	108
River / brook lamprey (transformer)	1	N/A	N/A	115
Salmon	55	67 ¹⁸	0.06	78
Stone loach	12	15	0.01	90
Three-spined stickleback	22	23 ¹⁸	0.02	30

¹⁷ Lower than count because population estimate was calculated from targeted lamprey surveys only and did not include those caught during the main electric fishing survey.

¹⁸ Model rejected (P < 0.2).

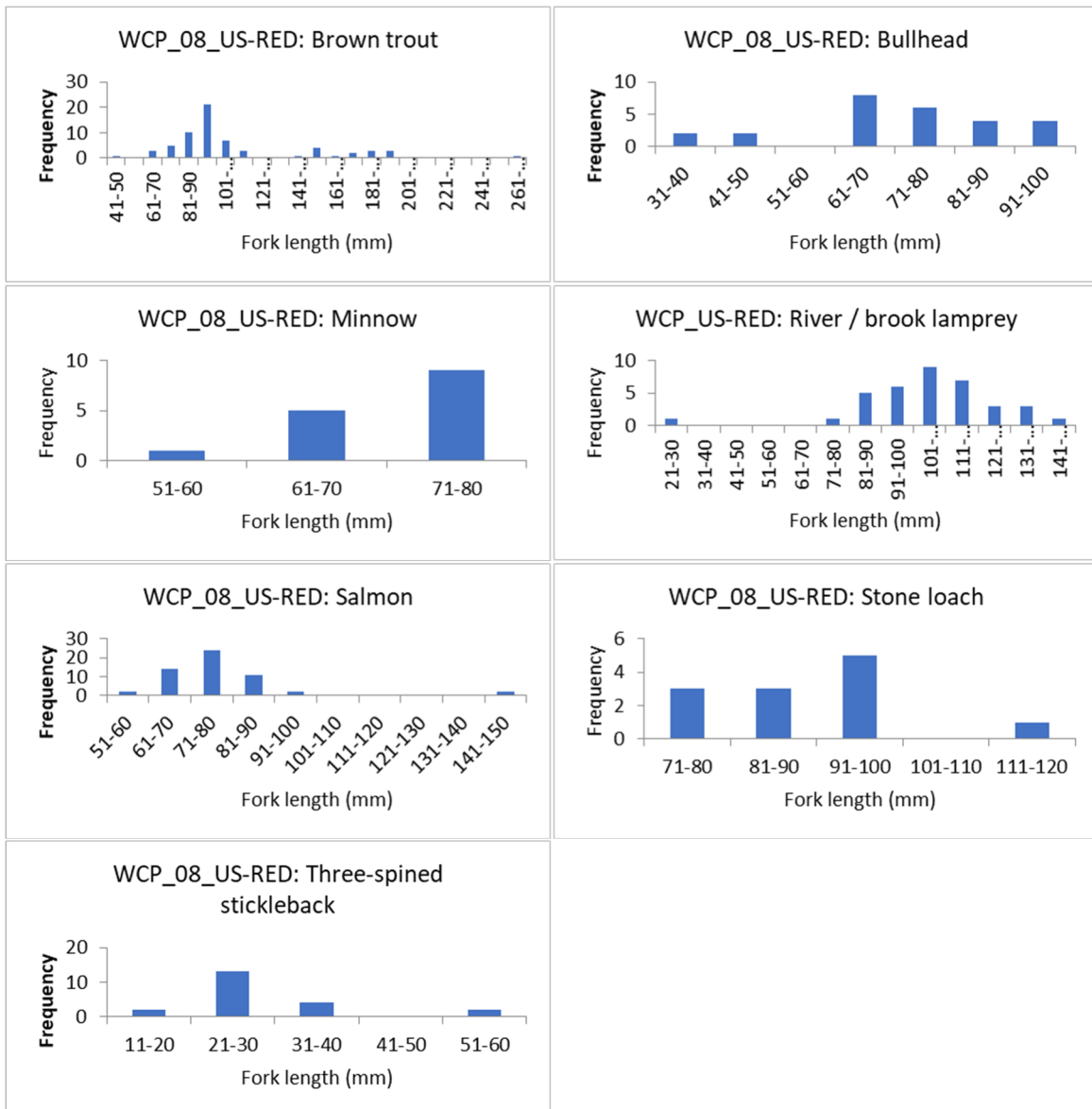
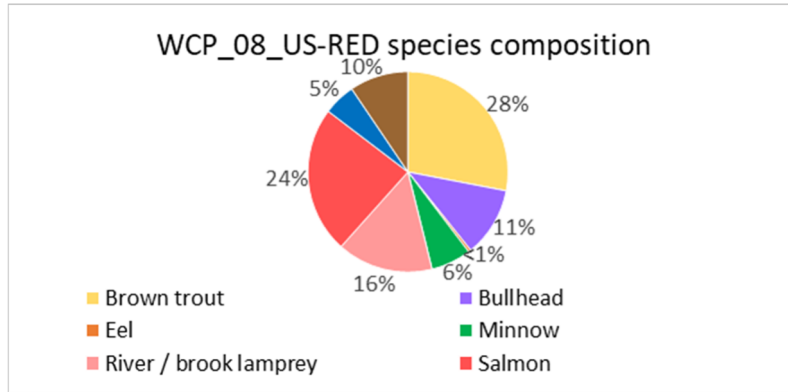


Plate 5: WCP_08_US-RED: Species composition and length frequency histograms

Appleby to Brough

WCP_11 (Unnamed Tributary of Mire Sike 6.12)

- 6.19.5.37 A 90 m quantitative electric fishing survey, comprised of three runs, was undertaken at site WCP_11. The survey area was 90m². The average width of the channel was 1 m, the average depth was 0.15m and the maximum depth was 0.25m. The bed substrate was mostly comprised of cobbles and gravel / coarse sand. The main flow type was shallow glide / run. Coarse substrate, submerged vegetation, woody debris and undercut banks provided potential sources of cover for fish.
- 6.19.5.38 A targeted juvenile lamprey survey was not undertaken at this site due to an absence of suitable habitat.
- 6.19.5.39 A total of 147 fish were caught at this site during the electric fishing survey. Species population estimates, densities and average length are presented in Table 11: Number of fish captured at WCP_11, population estimates, population density per m² and average (mean) fork lengths.. A population estimate could not be calculated for eel as only one eel was captured at this site.
- 6.19.5.40 A species composition chart and length frequency histograms are presented in Plate 6: WCP_11: Species composition and length frequency histogram.
- 6.19.5.41 The eDNA survey also identified the presence of the three-spined stickleback (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 11: Number of fish captured at WCP_11, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Bullhead	4	N/A	0.04	78
Eel	1	N/A	N/A	260
Minnow	129	136	1.51	45
Stone loach	13	14	0.16	71

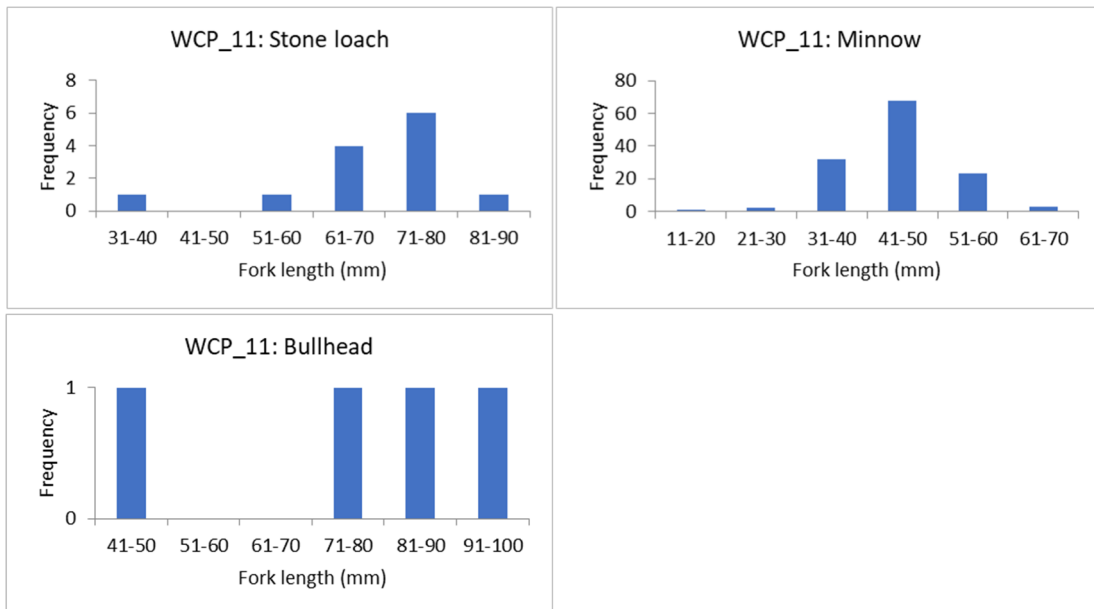
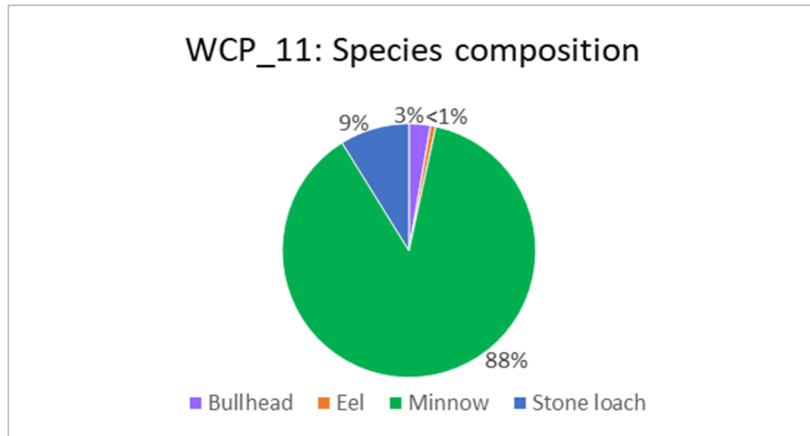


Plate 6: WCP_11: Species composition and length frequency histogram

WCP_13 (Cringle Beck)

- 6.19.5.42 A 100 m quantitative electric fishing survey, comprised of three runs, was undertaken at site WCP_13. The survey area was 100m². The average width of the channel was 1m, the average depth was 0.10 m and the maximum depth was 0.20 m. The bed substrate was mostly comprised of cobbles, gravel / coarse sand and some boulders. The flow type was shallow glide / run. Coarse substrate, tree root systems and undercut banks provided potential sources of cover for fish. Filamentous algae was present.
- 6.19.5.43 A targeted juvenile lamprey survey was not undertaken at this site due to an absence of suitable habitat.
- 6.19.5.44 A total of 56 fish were caught at this site during the electric fishing survey. Species population estimates, densities and average length are presented in Table 12: Number of fish captured at WCP_13,

population estimates, population density per m² and average (mean) fork lengths.. Population estimates for brown trout and salmon could not be calculated as only one of each of these species were captured at this site. A species composition chart and length frequency histograms are presented in Plate 7: WCP_13: Species composition and length frequency histograms.

6.19.5.45 The eDNA survey also identified the presence of bullhead (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 12: Number of fish captured at WCP_13, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Brown trout	1	N/A	N/A	73
Minnow	20	22	0.22	52
Salmon	1	N/A	N/A	72
Three-spined stickleback	34	40* ¹⁹	0.4	27

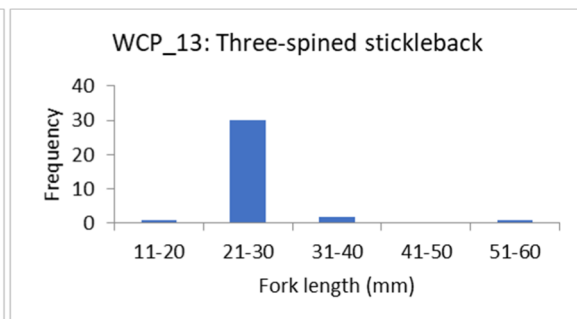
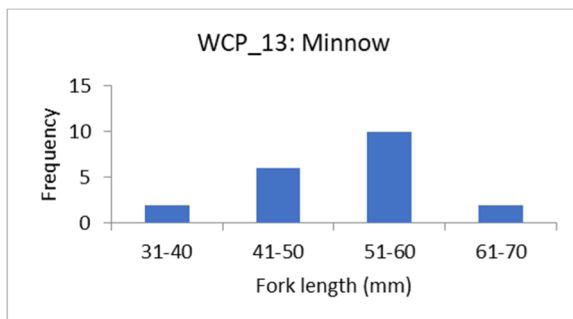
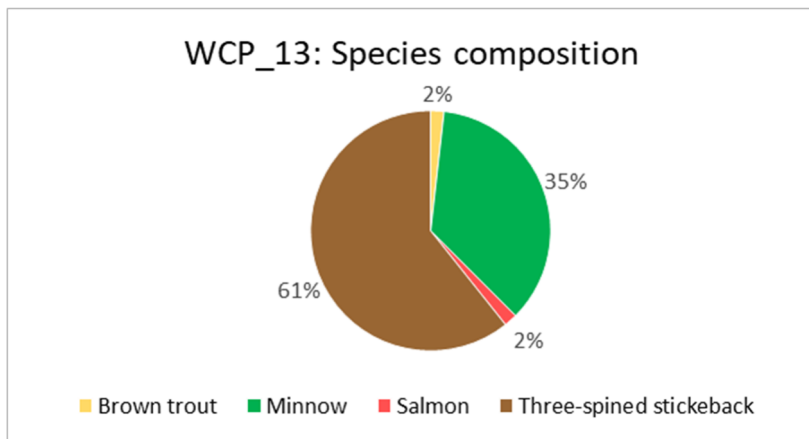


Plate 7: WCP_13: Species composition and length frequency histograms

¹⁹ Model rejected (P < 0.2).

WCP_15 (Moor Beck)

- 6.19.5.46 A 100 m quantitative electric fishing survey, comprised of three runs, was undertaken at site WCP_15. The survey area was 250m². The average width of the channel was 2.5 m, the average depth was 0.15 m and the maximum depth was 0.40m. The bed substrate was mostly comprised of cobbles and gravel / coarse sand. Boulders were present in low numbers and there were some areas of fine sand / silt. The main flow type was shallow glide / ruin and there were some areas of riffle. Coarse substrate, submerged vegetation, woody debris, undercut banks and overhang provided potential sources of cover for fish. Filamentous and non-filamentous algae was present.
- 6.19.5.47 Juvenile lamprey surveys were undertaken at one 1m² area of optimal habitat and three 1 m² areas of sub-optimal habitat.
- 6.19.5.48 A total of 155 fish were caught at this site during the electric fishing survey. Species population estimates, densities and average length are presented in Table 13: Number of fish captured at WCP_15, population estimates, population density per m² and average (mean) fork lengths.. A total of 5 lamprey (4 ammocoetes and 1 transformer) were caught during the main electric fishing survey and a total of 5 lamprey (ammocoetes) were caught during the targeted lamprey surveys. The lamprey population estimate has been calculated using the data from the targeted lamprey surveys. A population estimate could not be obtained for lamprey (transformer) due to low capture numbers. A population estimate could not be calculated for eel as only two of this species were caught.
- 6.19.5.49 A species composition chart and length frequency histograms are presented in Plate 8: WCP_15: Species composition and length frequency histograms.
- 6.19.5.50 The eDNA survey also identified the presence of minnow and gudgeon (*Gobio gobio*) (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 13: Number of fish captured at WCP_15, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Bullhead	50	N/A	0.10	58
Brown trout	85	86	0.34	87
Eel	2	N/A	N/A	338
River / brook lamprey (ammocoete)	9	7 ²⁰	1.75	105
River / brook lamprey (transformer)	1	N/A	N/A	140

²⁰ Lower than count because population estimate was calculated from targeted lamprey surveys only and did not include those caught during the main electric fishing survey.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Salmon	7	8	0.03	77
Three-spined stickleback	2	3 ²¹	0.01	35

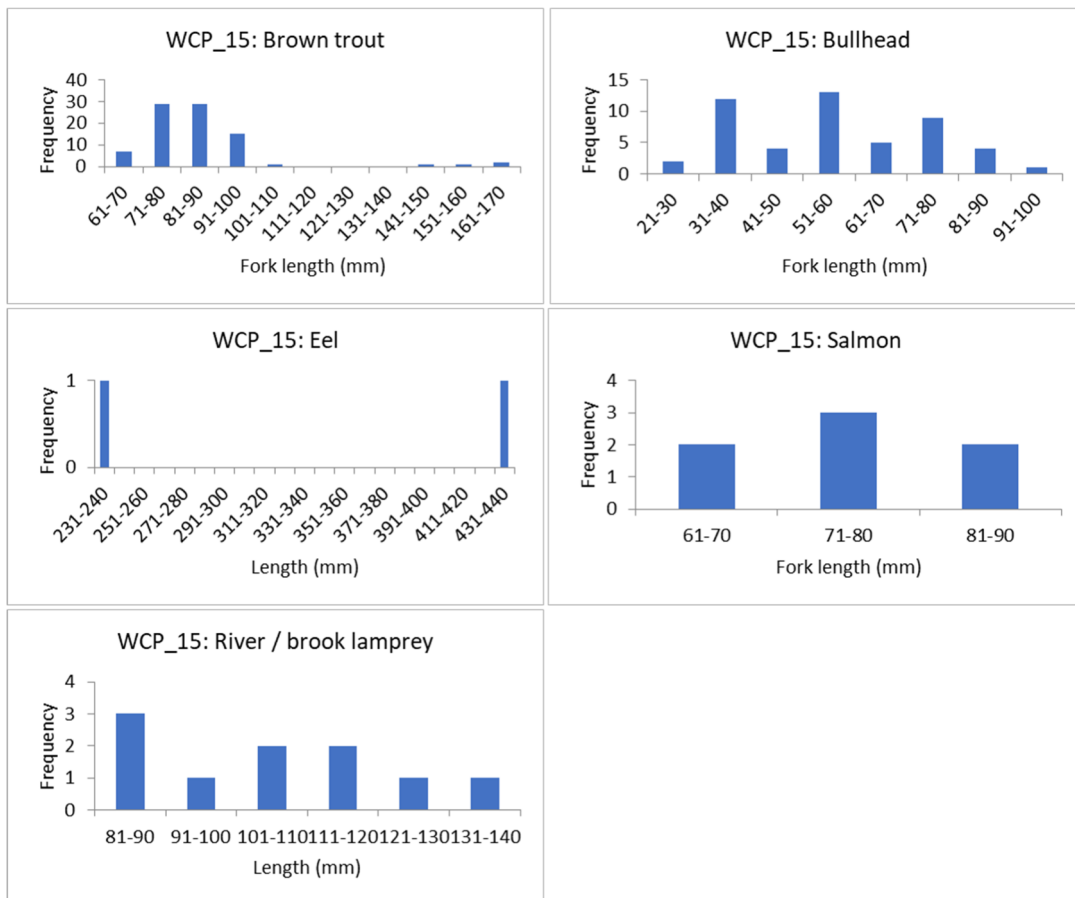
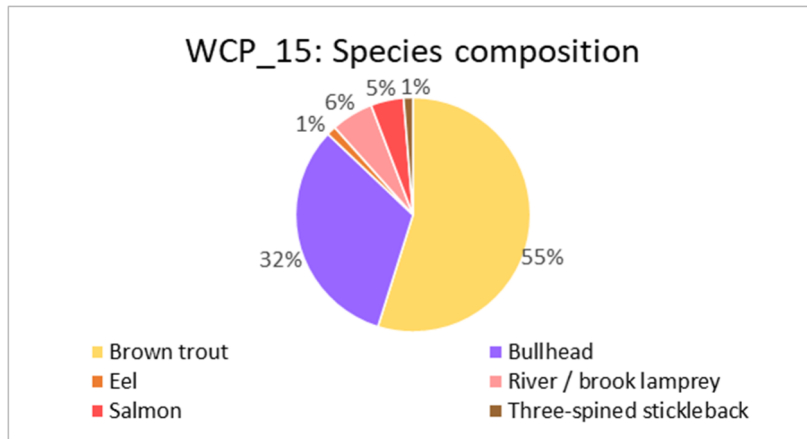


Plate 8: WCP_15: Species composition and length frequency histograms

²¹ P value not provided by Carle & Strub analysis.

WCP_16 (Moor Beck)

- 6.19.5.51 A 100 m quantitative electric fishing survey comprised of three runs was undertaken at site WCP_16. The survey area was 200m². The average width of the channel was 2m, the average depth was 0.20m and the maximum depth was 0.50 m. The bed substrate was mostly comprised of cobble and gravel / coarse sand. Boulders were also present and there were some small areas of fine sand / silt. The flow type was shallow glide / run. Coarse substrate and undercut banks provided potential sources of cover for fish. Filamentous algae was present.
- 6.19.5.52 Juvenile lamprey surveys were undertaken at four 1m² areas of optimal lamprey habitat.
- 6.19.5.53 A total of 71 fish were caught at this site during the survey. Species population estimates, densities and average length are presented in Table 14: Number of fish captured at WCP_16, population estimates, population density per m² and average (mean) fork lengths..
- 6.19.5.54 A total of 4 lamprey (ammocoetes) were caught during the main electric fishing survey and a total of 3 lamprey (ammocoetes) were caught during the targeted lamprey surveys. A population estimate could not be obtained for lamprey due to low capture numbers. An eel was seen but the surveyor operating the electric fishing kit was unable to catch it. It has still been included in the data and its length is an estimate. A population estimate could not be calculated for eel as only one eel was recorded at this site. A species composition chart and length frequency histograms are presented in Plate 9: WCP_16: Species composition and length frequency histograms.
- 6.19.5.55 The eDNA survey also identified the presence of three-spined stickleback (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 14: Number of fish captured at WCP_16, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Bullhead	26	N/A	0.10	57
Brown trout	23	24**	0.12	95
Eel	1	N/A	N/A	450 ²²
River / brook lamprey (ammocoetes)	7	N/A	N/A	92
Salmon	14	15 ²³	0.08	77

²² Length is an estimate.

²³ P value not provided by Carle & Strub analysis.

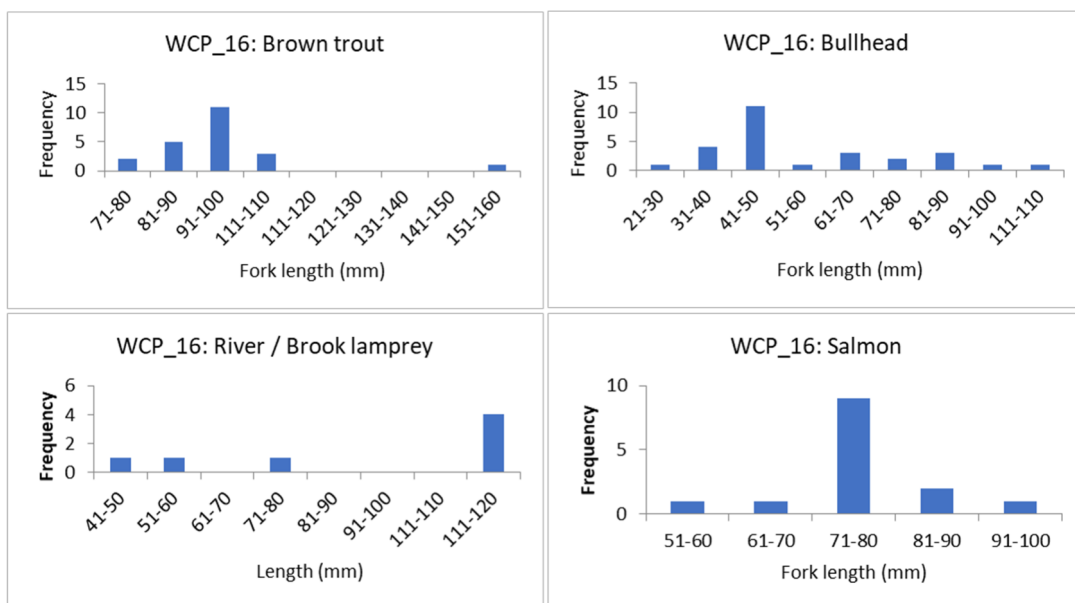
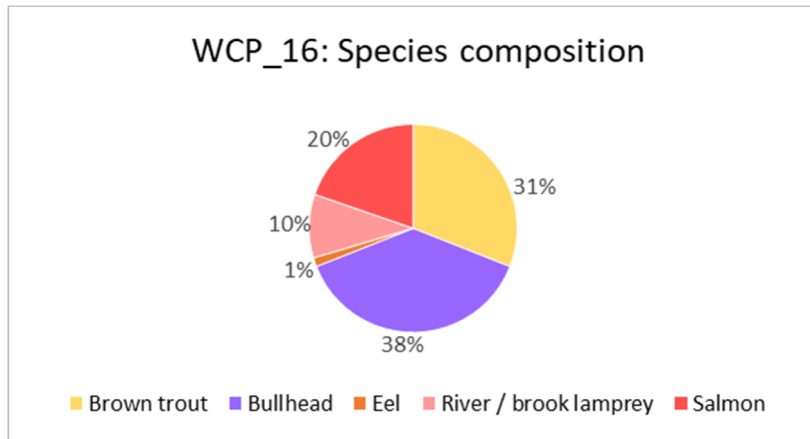


Plate 9: WCP_16: Species composition and length frequency histograms

WCP_17 (Eastfield Sike)

- 6.19.5.56 A 50 m quantitative electric fishing survey, comprised of three runs, was undertaken at site WCP_17. The survey area was 87.5m². The average width of the channel was 1.75 m, the average depth was 0.20m and the maximum depth was 0.40m. The bed substrate was mostly comprised of boulder, cobble, gravel / coarse sand and fine sand / silt. The flow type was glide / run. Coarse substrate, tree root systems and woody debris provided potential sources of cover for fish. Two white-clawed crayfish were found during the electric fishing survey.
- 6.19.5.57 Juvenile lamprey surveys were undertaken at four 1m² areas of optimal lamprey habitat.
- 6.19.5.58 A total of 163 fish were caught at this site during the survey. Species population estimates, densities and average length are presented in Table 15: Number of fish captured at WCP_17, population estimates, population density per m² and average (mean) fork lengths.. A

population estimate could not be calculated for stone loach due to low capture number and insufficient capture depletion for this species. A total of 3 lamprey (2 ammocoetes and 1 transformer) were caught during the main electric fishing survey and a total of 5 lamprey (ammocoetes) were caught during the targeted lamprey surveys. A population estimate could not be obtained for lamprey due to the low numbers captured. A species composition chart and length frequency histograms are presented in Plate 10: WCP_17: Species composition and length frequency histograms.

6.19.5.59 The eDNA survey also identified the presence of salmon (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 15: Number of fish captured at WCP_17, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Bullhead	5	N/A	0.03	53
Brown trout	14	15 ²⁴	0.17	77
Minnow	59	63	0.72	59
River / brook lamprey (ammocoetes)	7	N/A	N/A	112
River / brook lamprey (transformer)	1	N/A	N/A	125
Stone loach	4	N/A	N/A	77
Three-spined stickleback	73	103 ²⁴	1.18	29

²⁴ Model rejected (P <0.2).

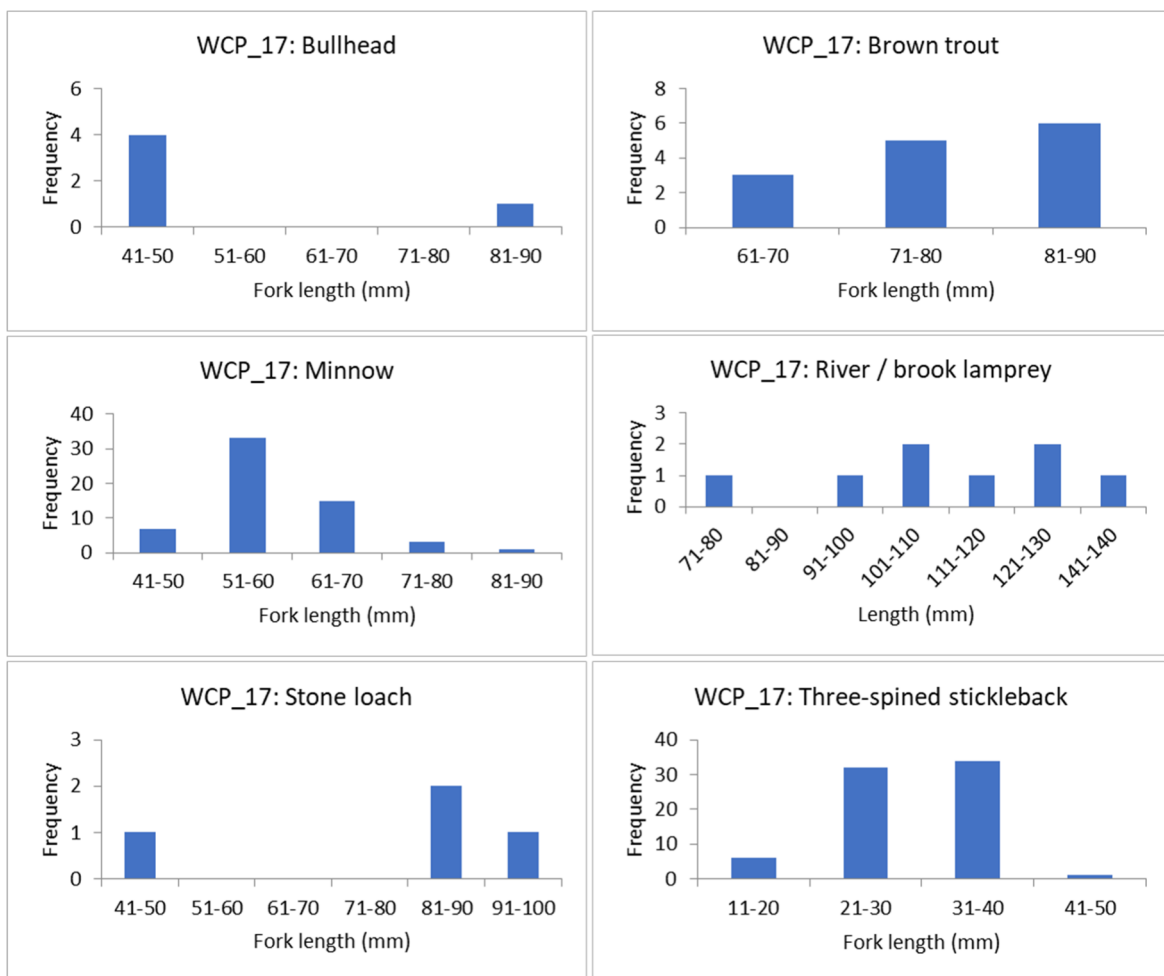
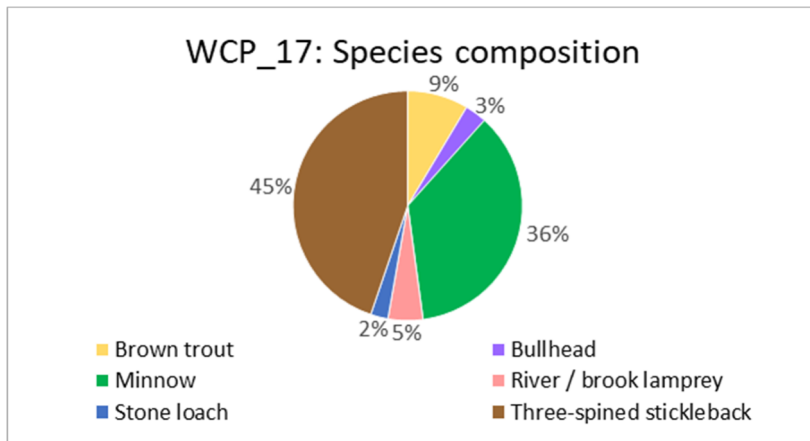


Plate 10: WCP_17: Species composition and length frequency histograms

WCP_18 (Unnamed Tributary of Lowgill Beck 6.1)

6.19.5.60 WCP_18 was choked with vegetation and most of the channel could not be accessed due to dense vegetation. The surveyors could therefore not undertake an electric fishing survey over a continuous reach of accessible channel. Instead, a presence / absence survey was undertaken in accessible areas within a 130m reach.

- 6.19.5.61 The average width was 0.75m, the average depth was 0.03m and the maximum depth was 0.08m. The dominant bed substrate was fine sand / silt and gravel / coarse sand and cobble were also present. The flow type was shallow glide / run. Coarse substrate and overhang provided potential sources of cover for fish.
- 6.19.5.62 No fish were captured during this survey. RSK Biocensus surveyors also visited this site in September 2021 to undertake an autumn aquatic macroinvertebrate survey; one three-spined stickleback and one white-clawed crayfish were caught here during the macroinvertebrate kick sampling.
- 6.19.5.63 The eDNA survey identified the presence of eel and three-spined stickleback at this site (Table 4: Summary of the electric fishing and the eDNA survey results).
- WCP_19 (Lowgill Beck)*
- 6.19.5.64 A 100 m quantitative electric fishing survey comprised of three runs was undertaken at WCP_19. The survey area was 200 m². The average width of the channel was 2.00 m, the average depth was 0.20 m and the maximum depth was 0.45 m. The bed substrate was comprised of cobble, gravel / coarse sand and fine sand / silt. The flow type was glide / run with some small sections of riffle. Coarse substrate, submerged vegetation and undercut banks provided potential sources of cover for fish. Filamentous algae was present.
- 6.19.5.65 Juvenile lamprey surveys were undertaken at four 1m² areas of optimal lamprey habitat but no lamprey were caught during these targeted surveys.
- 6.19.5.66 A total of 212 fish were caught at this site during the survey. Species population estimates, densities and average length are presented in Table 16: Number of fish captured at WCP_19, population estimates, population density per m² and average (mean) fork lengths.. A species composition chart and length frequency histograms are presented in Plate 11: WCP_19: Species composition and length frequency histograms.
- 6.19.5.67 The eDNA survey did not identify any additional species and matched species caught during the electric fish survey (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 16: Number of fish captured at WCP_19, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Bullhead	9	N/A	0.03	55
Minnow	76	84	0.42	54
River / brook lamprey (ammocoete)	1	N/A	N/A	170

River / brook lamprey (transformer)	9	N/A	N/A	170
Stone loach	17	22	0.11	55
Three-spined stickleback	102	111	0.56	32

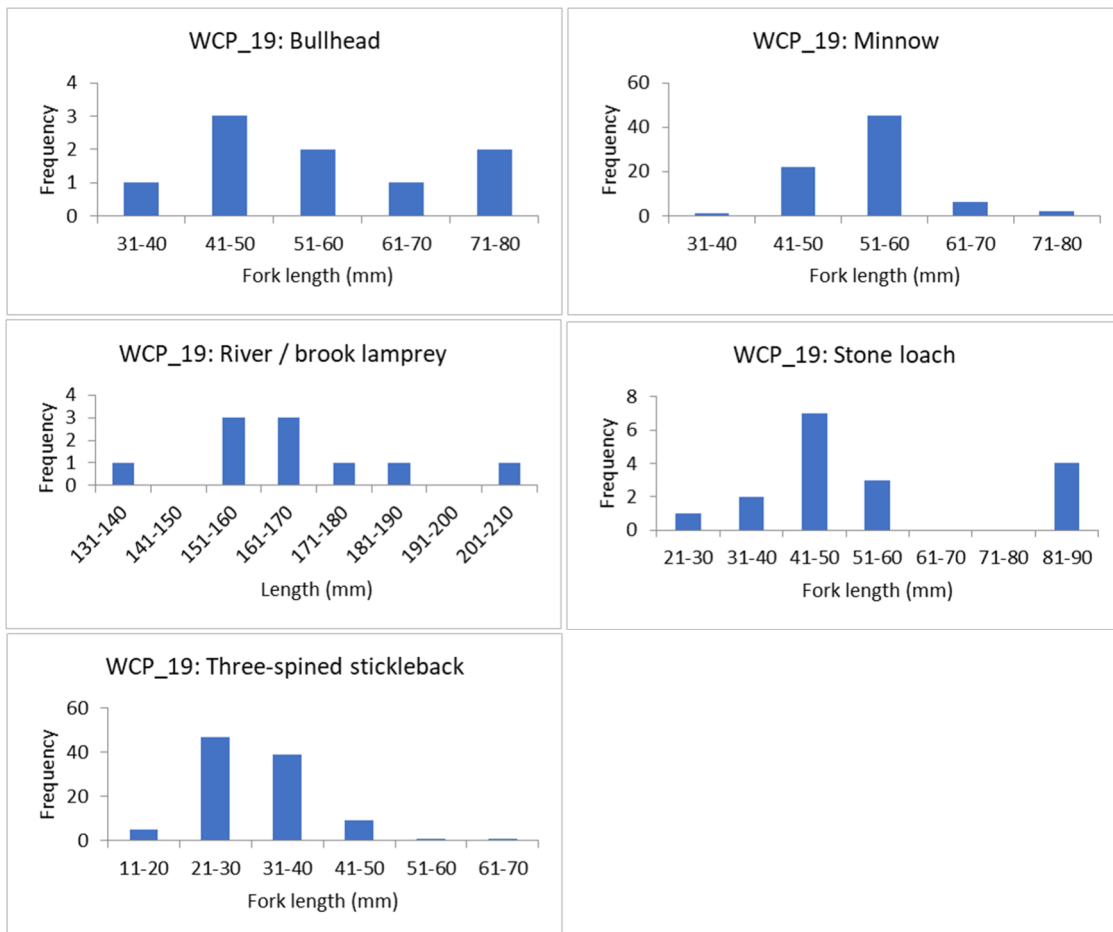
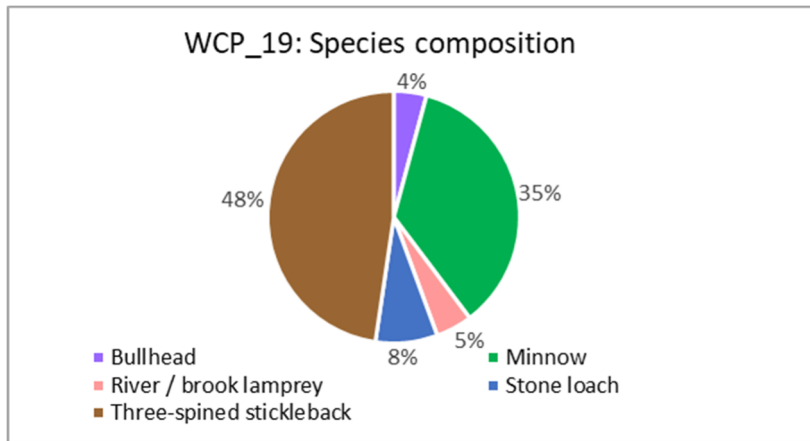


Plate 11: WCP_19: Species composition and length frequency histograms

WCP_19_YS (Yosgill Sike)

- 6.19.5.68 No electric fish survey was completed at this site which is located immediately upstream of the existing A66 crossing and the confluence with Lowgill Beck.
- 6.19.5.69 The eDNA survey results confirmed the presence of the following species: bullhead, brown trout, eel, minnow and stone loach (Table 4: Summary of the electric fishing and the eDNA survey results).

WCP_19_WS (Woodend Sike)

- 6.19.5.70 No electric fish survey was completed at this site which is located immediately upstream of the existing A66 crossing and the confluence with Lowgill Beck.
- 6.19.5.71 The eDNA survey results confirmed the presence of the following species: bullhead, brown trout, eel, minnow, stone loach and three-spined stickleback (Table 4: Summary of the electric fishing and the eDNA survey results).

Bowes Bypass

WCP_20 (Unnamed Tributary of River Greta 7.3)

- 6.19.5.72 A 100m quantitative electric fishing survey, comprised of two runs, was undertaken at site WCP_20. The survey area was 75m². The surveyors finished the survey after two runs because no fish had been captured. The average channel width was 0.75m, the average depth was 0.05m and the maximum depth was 0.30m. The main bed substrate was cobble with some scattered boulders. Coarse substrate undercut banks and overhang provided potential sources of cover for fish.
- 6.19.5.73 A targeted juvenile lamprey survey was not undertaken at this site due to an absence of suitable habitat.
- 6.19.5.74 No eDNA sample was collected at this site due to the presence of a waterfall approximately 50m upstream (NGR: NZ0016113199) of the River Greta that is considered a barrier to migration for all species of fish. Further details are provided in Appendix 6.17: Fish Habitat Assessment and MoRPH (Application Document 3.4).

Cross Lanes to Rokeby

WCP_23 (Unnamed Tributary of Tutta Beck 8.1)

- 6.19.5.75 This site was completely dry at the time of visit and therefore neither a fish survey or eDNA survey could be undertaken.

WCP_24_BLUE (Punder Gill)

- 6.19.5.76 A 100 m quantitative electric fishing survey, comprised of two runs, was undertaken at site WCP_24_BLUE. The survey area was 120m². The surveyors finished the survey after two runs because no fish had been captured. The average channel width was 1.20m, the average

depth was 0.03m and the maximum depth was 0.60m. The main bed substrate was cobble, with gravel / coarse sand, scattered boulders and some sections of fine sand / silt also present. Filamentous algae was present. The flow type was shallow glide/run. Coarse substrate and woody debris provided potential sources of cover for fish.

- 6.19.5.77 A targeted juvenile lamprey survey was not undertaken at this site due to an absence of suitable habitat.
- 6.19.5.78 No fish species were identified from this site during the eDNA survey.

WCP_24 (Tutta Beck)

- 6.19.5.79 A 100 m quantitative electric fishing survey, comprised of three runs, was undertaken at WCP_24. The survey area was 100m². The average channel width was 1 m, the average depth was 0.15m and the maximum depth was 0.35m. The main bed substrate was cobble, gravel / coarse sand and fine sand / silt. Some scattered boulders were also present. The flow type was shallow glide / run and some pooled sections were present. Coarse substrate, woody debris and overhang provided potential sources of cover for fish.
- 6.19.5.80 A targeted juvenile lamprey survey was not undertaken at this site due to an absence of suitable habitat.
- 6.19.5.81 A total of three fish were caught at this site. Species population estimates, densities and average length are presented in Table 17: Number of fish captured at WCP_24, population estimates, population density per m² and average (mean) fork lengths.. A length frequency histogram is presented in Plate 12: WCP_24: Species composition and length frequency histograms.
- 6.19.5.82 The eDNA survey results also confirmed the presence of bullhead (Table 4: Summary of the electric fishing and the eDNA survey results).

Table 17: Number of fish captured at WCP_24, population estimates, population density per m² and average (mean) fork lengths.

Species captured	Number of fish caught	Carle & Strub population estimate	Abundance estimate (density per m ²)	Average fork length (mm)
Brown trout	3	4	0.04	71

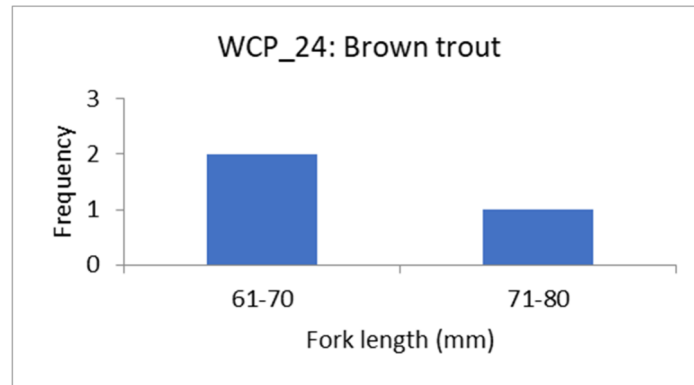


Plate 12: WCP_24: Species composition and length frequency histograms

Stephen Bank to Carkin Moor

WCP_28 (Unnamed Tributary of Holme Beck 9.6)

- 6.19.5.83 This site was not screened in for electric fishing survey. No fish species were identified from this site during the eDNA survey²⁵ (Table 4: Summary of the electric fishing and the eDNA survey results).

WCP_30 (Mains Gill)

- 6.19.5.84 This site was dry at the time of visit and therefore a fish survey could not be undertaken.
- 6.19.5.85 The eDNA survey results from this site confirmed the presence of three-spined stickleback only (Table 4: Summary of the electric fishing and the eDNA survey results).

WCP_30_DS (Mains Gill)

- 6.19.5.86 The surveyors could not access this site as there were suckler cows present in the surrounding land which represented a significant safety risk for surveyors. An eDNA survey was not conducted at this site.

WCP_33 (Unnamed Tributary of Holme Beck 9.2)

- 6.19.5.87 A 100m quantitative electric fishing survey, comprised of two runs, was undertaken at site WCP_33. The survey area was 96m². The surveyors finished the survey after two runs because no fish had been captured. The average channel width was 1.00m, average depth was 0.10m and the maximum depth was 1.00m in a pooled section at the upstream survey extent next to the culvert. The main bed substrate was gravel / coarse sand, cobble and fine sand / silt. The flow type was shallow glide run throughout with the exception of the deep pool at the upstream survey extent. Coarse substrate and woody debris provided potential sources of cover for fish.
- 6.19.5.88 A targeted juvenile lamprey survey was not undertaken at this site due to an absence of suitable habitat.

²⁵ The driver for the use of eDNA at this site was to determine white-clawed crayfish presence (as opposed to fish).

6.19.5.89 The eDNA survey results from this site confirmed the presence of bullhead only (Table 4: Summary of the electric fishing and the eDNA survey results).

Future baseline

6.19.5.90 The ecological baseline conditions described above represent those which currently exist in the absence of the scheme and at the time of writing. As stated in section 3 of Chartered Institute Ecology and Environmental Management (CIEEM)'s Guidelines for Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management, 2019)²⁶, potential changes in baseline conditions also need to be identified in order to assess impacts.

6.19.5.91 Based on the above information and current land use, the future baseline in the absence of the scheme is unlikely to change significantly. Subtle changes are expected due to climate change, such as some movements of certain species and local population changes, however, the overall habitats and species composition in the study area are expected to be broadly similar to that of the existing baseline. Therefore, the future baseline would remain the same as set out in the existing baseline.

6.19.6 Discussion

Protected and/or notable species

6.19.6.1 Protected and/or notable species of fish were found across all survey sites where fish were caught. These species are:

- Atlantic salmon (*Salmo salar*): Atlantic salmon are an EC Habitats Directive Annex II species and are a UK Biodiversity Action Plan (BAP) priority fish species
- Bullhead (*Cottus gobio*): Bullhead are an EC Habitats Directive Annex II species and listed on the International Union for Conservation of Nature (IUCN) red list of threatened species
- River (*Lampetra fluviatilis*) / Brook (*Lampetra planeri*) Lamprey: Lamprey are an EC Habitats Directive Annex II species and are a UK Biodiversity Action Plan (BAP) priority fish species
- European eel (*Anguilla anguilla*): European eel are listed as Critically endangered on the IUCN red list of threatened species. They are a UK Biodiversity Action Plan priority species, a species of principal importance for the purpose of conserving biodiversity under the NERC act 2006 and protected under the Eels (England and Wales) Regulations 2009
- Brown Trout (*Salmo trutta*): Brown Trout are a UK Biodiversity Action Plan priority fish species

6.19.6.2 All freshwater fish species are protected under Salmon and Freshwater Fisheries Act 1975.

²⁶ Chartered Institute of Ecology and Environmental Management (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater Coastal and Marine

Mitigation recommendations

- 6.19.6.3 For all sites where fish were encountered mitigation is likely to be required if the watercourses are to be drained or diverted during construction of the Project. Mitigation is likely to include a fish translocation and the presence of an aquatic ecological clerk of works whilst works are being undertaken.
- 6.19.6.4 Where works are undertaken in close proximity to a watercourse, or at the top of slopes which lead down to watercourses, silt screens/matts should be installed to minimise the risk of fine sediment being washed downstream. Suitable spill kits/bunds should also be made available on site to manage chemical / fuel spills. Loose spoil heaps should also be covered and positioned as far from the watercourse as is reasonably practicable.
- 6.19.6.5 It is an offence under the Salmon and Freshwater Fisheries Act 1975 (as amended) to wilfully disturb spawning fish of any species, or habitat in which spawn is likely to be present. Any in-channel works should therefore be timed to avoid spawning periods (1st October to 31st May for salmonid waters) where possible, with appropriate Environment Agency consents in place.
- 6.19.6.6 The design of new watercourse crossings should facilitate the free movement of fish under a variety of flow conditions and aim to maintain or enhanced aquatic habitats and the fluvial geomorphological processes that control their distribution and quality.

6.19.7 References

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