Technical Appendix 6.5: Fisheries Survey Report

Technical Appendix 6.5 Fisheries Survey Report

Watchman Energy Park

Watchman Energy Park Limited

Prepared by:

SLR Consulting Limited

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SLR Project No.: 413.V00595.00XM2

14 October 2025

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WATCHMAN ENERGY PARK– BASELINE FISH SURVEYS 2023

David McColl, Marissa Wong, Toby Miller and William E. Yeomans

1++ (upper) and 0+ Trout from the Shiel Cleuch (Site CDR032F)

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www.clyderiverfoundation.org

Report reference: **2023/10**

Date: **16 July 2023**

Project supported by MacArthur Green[1]

[1] Following acquisition, MacArthur Green became part of SLR Consulting Limited on 1 September 2025.

1. INTRODUCTION

The Clyde River Foundation (CRF) was contracted by MacArthur Green[1] to undertake a baseline survey of the fish in burns in relation to the proposed Watchman Energy Park (the Proposed Development), near Elvanfoot, South Lanarkshire.

2. METHODS

The fish communities at ten sites were sampled by electric fishing from 20/06/2023 to 22/06/2023 (Figure 1; Appendix 1, Plates 1 to 10 inclusive).

Following the guidance provided by Scottish Government scientists[2], electric fishing was carried out using an E-Fish 500E backpack (fishing setting 200V smoothed DC). When captured, fish were anaesthetised in a dilute solution of 2-phenoxyethanol, identified and their fork length measured to the nearest mm on a lengthing board. Fish were allowed to recover in natal water before being returned to the river.

Fish were caught using a banner net and / or short-handled fry nets where conditions were appropriate. Sites were fished with a single pass (semi-quantitative data) or three passes (quantitative data) by wading upstream between stop nets. Single pass fishing generates a "minimum estimate" of the fish population size and three pass fishing a more accurate statistical population estimate but the latter requires a larger number of fish to be present than is often the case in smaller streams (a rule-of-thumb is a minimum sample size of around 30 of each year class; Riley & Fausch 1992).

Generally, when a small number of brown trout (*Salmo trutta*), hereafter referred to as 'trout', are caught fishing is terminated at a site and the semi-quantitative data is reported as a one-run minimum estimate.

Fully quantitative data requires three fishing runs and such multi-pass removal methods use repeated sampling and the decline in the number of trout captured between successive passes is used to estimate capture probability and species abundance. In this case we report the estimated trout population size using the method of Carle & Strub (1978) (see Hedger *et al.* 2013).

Trout densities are expressed as fish/100m^2 of wetted river bed and are reported here as 0+ (young-of-the-year) and 1++ (older fish). Other fish species are reported as numbers caught. Site details and survey data are stored in the Scottish Fisheries Co-ordination Centre database[3]. Details of the fishery sampling sites and a summary of the

[2] https://www.gov.scot/publications/monitoring-watercourses-in-relation-to-onshore-wind-farm-developments-generic-monitoring-programme/

[3] https://fms.scot/sfcc/

fish communities recorded are given in **Table 1** and the location of the sampling sites are shown on **Figure 1**.

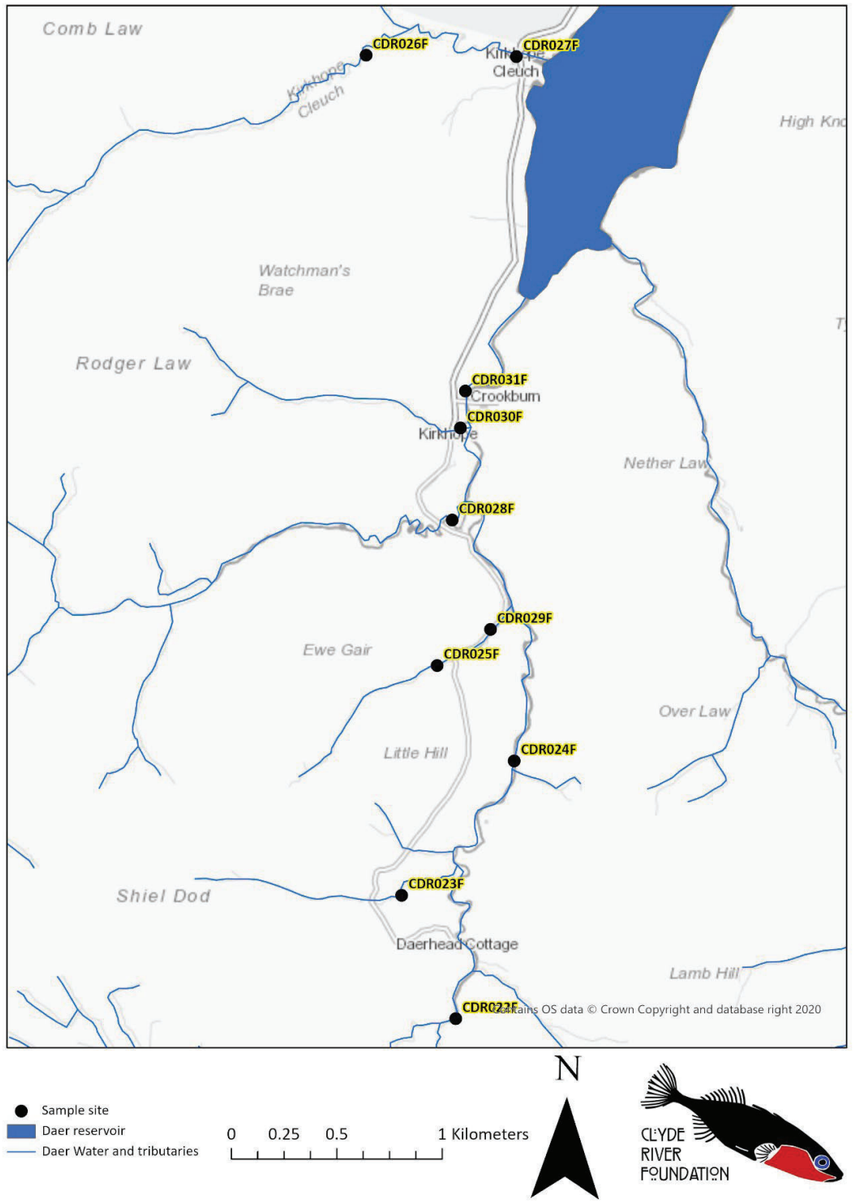

Figure 1: Fishery sampling locations; the main rivers flow from south to north.

3. RESULTS

The fish survey data are presented in **Table 1** and **Figures 2 to 4**.

No fish were captured at the upper site on the Howe Cleuch (CDR025F).

Among the other nine sites, trout was ubiquitous, and stone loach and minnow were present at six and four sites respectively (**Figures 2 to 4**).

Generally, more species of fish were caught in the larger burns.

Multiple year-classes of trout were present at all nine occupied sites, with the presence of young-of-the-year (0+) fish indicating successful spawning during the previous winter in the vicinity of the sampling site.

Other than at one site on the Daer Water (CDR024F), in the Howe Cleuch (CDR025F and CDR029F) and at the bottom end of the Kirkhope Cleuch (CDR027F), trout densities were high, particularly so in the Daer Water (at sites CDR022F & CDR031F), the Shiel Cleuch (CDR023F), the upper site on the Kirkhope Cleuch (CDR026F) and the Rodger Cleuch (CDR030F).

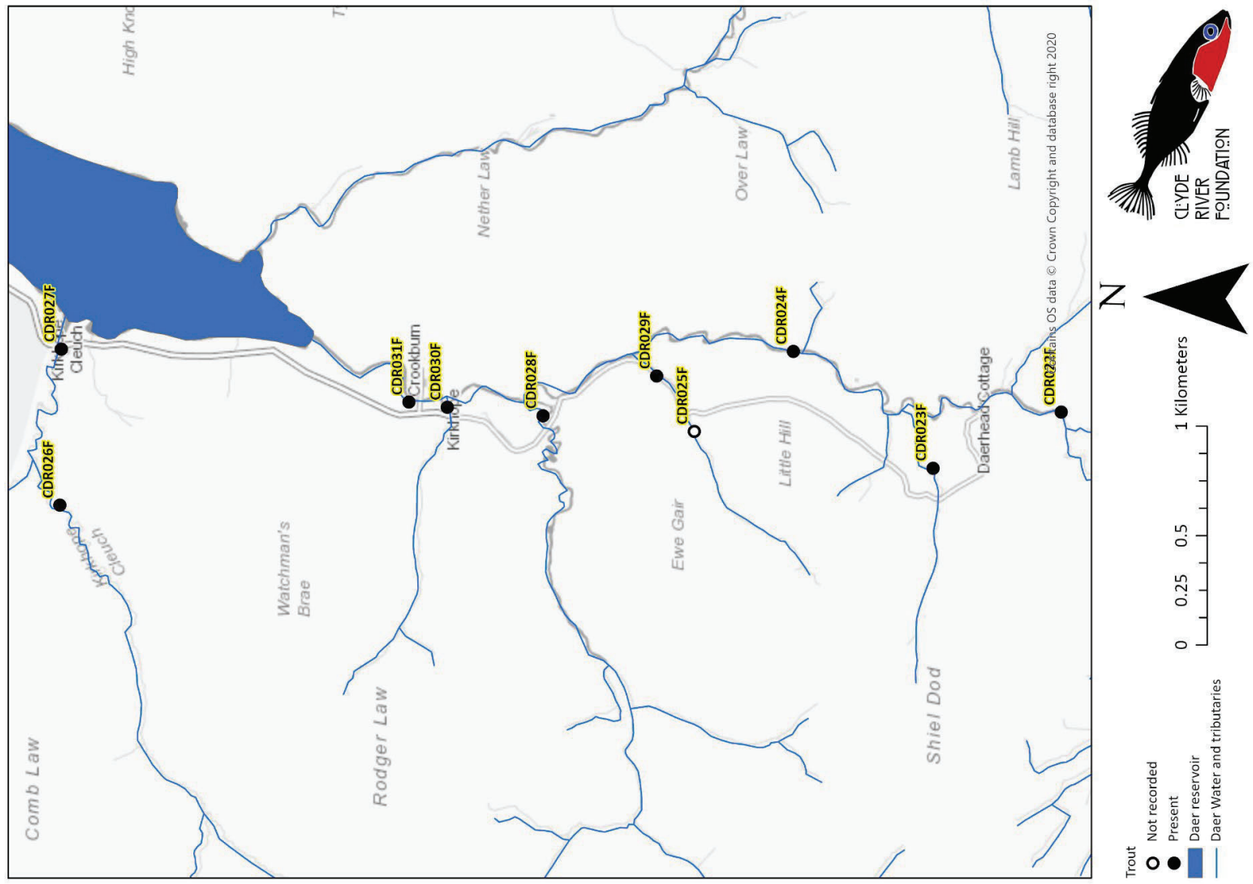

Figure 2: Distribution of trout.

Table 1: Sampling Sites and Summary of the Recorded Fish Communities.

Site Code (Figure 1)	Number of Fishing Runs	Watercourse	Easting	Northing	Sampling Date	Fish Species Caught			
						0+ Trout/ 100m²	1++ Trout/ 100m²	Minnow (number caught)	Stone Loach (number caught)
CDR022F	3	Daer Water	296360	602680	20/06/2023	140	45	2	1
CDR024F	1	Daer Water	296645	603852	20/06/2023	8	10	6	1
CDR031F	3	Daer Water	296417	605608	22/06/2023	97	26	82	16
CDR023F	3	Shiel Cleuch	296007	603221	20/06/2023	77	39		
CDR025F	1	Howe Cleuch	296351	604391	20/06/2023	No fish caught.			
CDR029F	1	Howe Cleuch	296588	604571	22/06/2023	2	13		
CDR028F	3	Carsehope Burn	296315	605046	21/06/2023	33	8	13	4
CDR030F	1	Rodger Cleuch	296365	605473	22/06/2023	265*	19*		2
CDR026F	3	Kirkhope Cleuch	295895	607199	21/06/2023	96	25		
CDR027F	3	Kirkhope Cleuch	296632	607252	21/06/2023	8	29		2

** The trout densities recorded from the Rodger Cleugh should be treated with caution. A large number of fish were captured in a small area and the very high value for 0+ fish may be an artefact of the multiplication factor involved in standardising the results to fish / 100 square metres. There were, however, a very large number of fish present and our raw data was an underestimate because of the difficulty in retrieving the fish from shallow water with a substratum heavily overgrown by filamentous algae.*

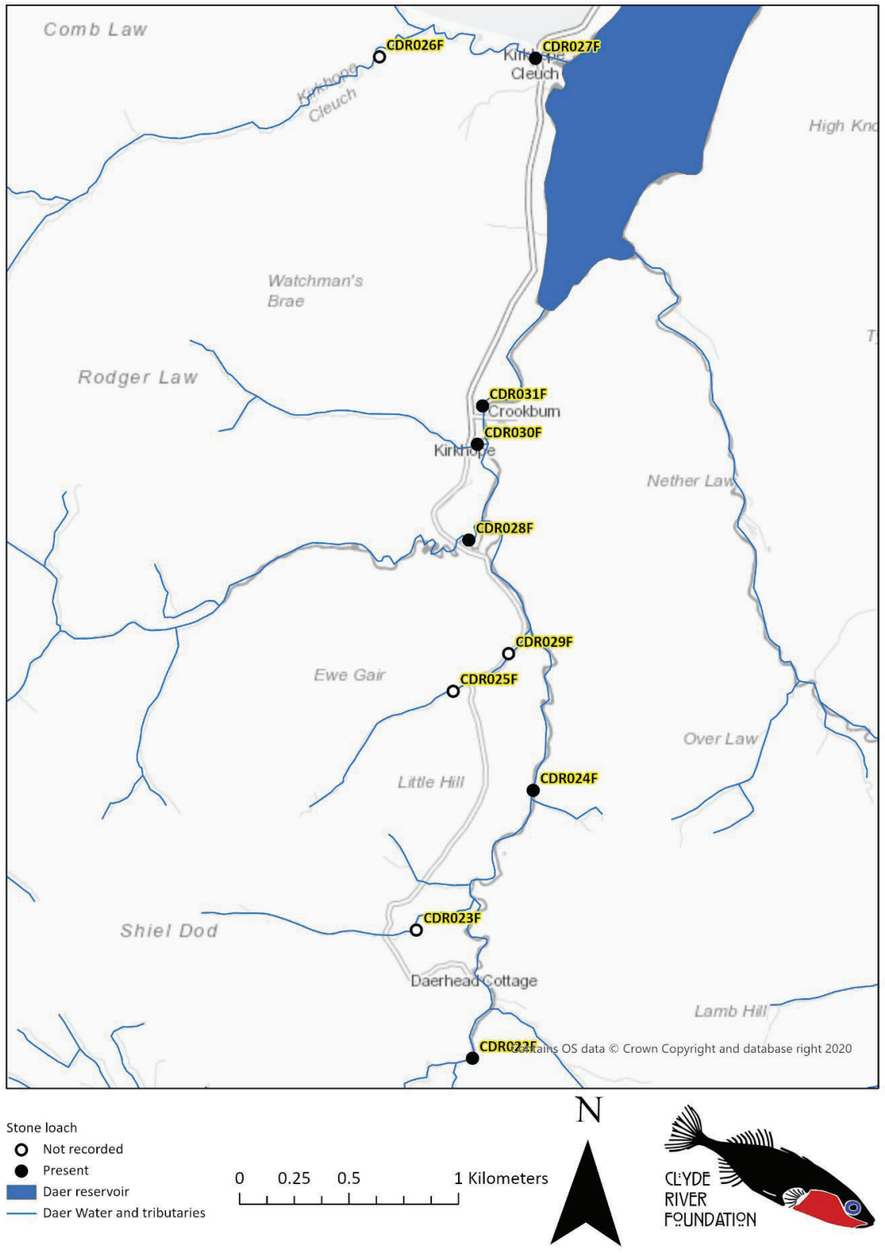

Figure 3: Distribution of stone loach.

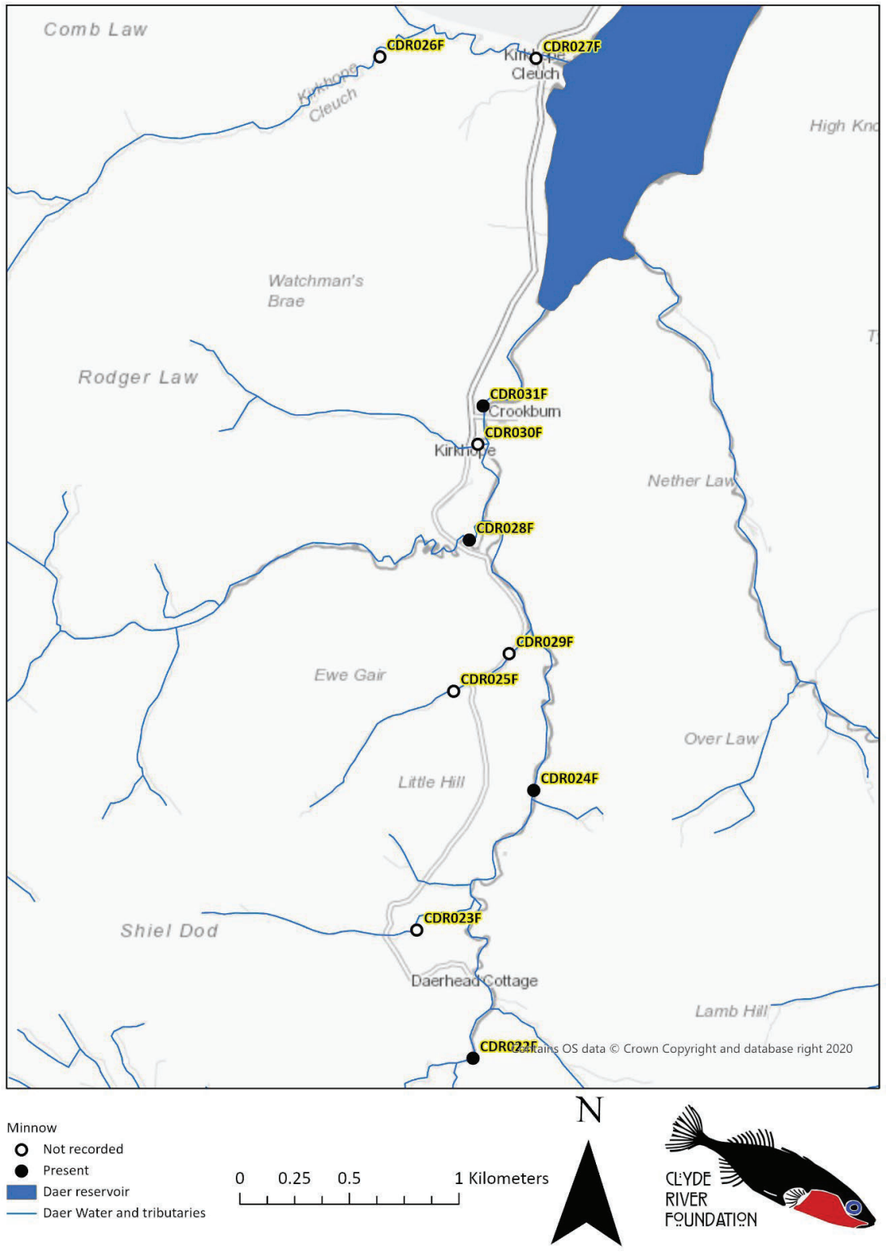

Figure 4: Distribution of minnow.

4. CONCLUSIONS

The fish communities described during this survey are typical for upland Clyde tributaries with no free access to/from the sea. The most diverse fish communities were recorded in the larger, lower gradient sites, where habitat diversity was greatest (particularly the slower flowing areas required by minnow (*Phoxinus phoxinus*)).

The data indicate permanent populations of trout throughout the survey area but these will likely be limited in the extreme upper reaches of the burns or upstream of impassable barriers (e.g., the upper Howe Cleuch).

There will be resident trout at each site and these will be supplemented by larger fish migrating upstream from the Daer Reservoir to spawn each autumn. The trout moving up from the reservoir therefore contribute to the high densities of juvenile fish seen in the Daer Water, Shiel Cleuch and Rodger Cleuch.

The very high density of 0+ trout recorded in the Rodger Cleuch was probably exaggerated by the sampling method and there was a perched culvert immediately upstream of the sampling site (under the road bridge) which may have limited upstream movement of pre-spawning trout. This could have resulted in a very high density of trout redds immediately upstream of the Daer Water. In addition to the sample reported here, we fished for a few metres immediately upstream of the road and there was a very much smaller density of trout present there.

5. ACKNOWLEDGEMENTS

We thank UCAPA Ltd for permission to use the electrofishing equipment.

6. REFERENCES

Carle, F. & Strub, M. (1978). A new method for estimating population size from removal data. Biometrics **34,** 621-630.

Hedger, R.D., de Eyto, E., Dillane, M., Diserud, O.H., Hindar, K., McGinnity, P., Poole, R. & Rogan, G. (1992). Improving abundance estimates from electrofishing removal sampling. Fisheries Research **137,** 104-115.

Riley, S. & Fausch, K.D. (1992). Underestimation of trout population size by maximum-likelihood removal estimates in small streams. North American Journal of Fisheries Management **12,** 768-776.

APPENDIX 1: PLATES

Plate 1: Site CDR022F; Daer Water.

Plate 2: Site CDR024F; Daer Water.

Plate 3: Site CDR031F; Daer Water.

Plate 4: Site CDR023F; Shiel Cleuch.

Plate 5: Site CDR025F; Howe Cleuch.

Plate 6: Site CDR029F; Howe Cleuch.

Plate 7: Site CDR028F; Carsehope Burn.

Plate 8: Site CDR030F; Rodger Cleuch.

Plate 9: Site CDR026; Kirkhope Cleuch.

Plate 10: Site CDR027; Kirkhope Cleuch.

WATCHMAN ENERGY PARK – BASELINE FISH SURVEY 2024

David McColl, Antonia Illingworth, Toby Miller, Paddy McCleave and William E. Yeomans

'Berried' female American signal crayfish from Sampling Site CDR037F, Old Town Burn

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Report reference: **2024/14**

Date: **30 June 2024**

Project supported by MacArthur Green[4]

[4] Following acquisition, MacArthur Green became part of SLR Consulting Limited on 1 September 2025.

1. INTRODUCTION

The Clyde River Foundation (CRF) was contracted by MacArthur Green[1] to undertake a baseline survey of the fish in burns within and in the vicinity of the proposed Watchman Energy Park (the Proposed Development), near Elvanfoot, South Lanarkshire.

2. METHODS

The fish communities at five sites were sampled by electric fishing on 21/06/2024 and 25/06/2024 (**Figure 1; Appendix 1, Plates 1 to 5** inclusive).

Following the guidance provided by Scottish Government scientists[5], electric fishing was carried out using an E-Fish 500E backpack (fishing setting 200V smoothed DC). When captured, fish were anaesthetised in a dilute solution of 2-phenoxyethanol, identified and their fork length measured to the nearest mm on a lengthing board. Fish were allowed to recover in natal water before being returned to the river.

Fish were caught using a banner net and/or short-handled fry nets where conditions were appropriate. Sites were fished with a single pass (semi-quantitative data) or three passes (quantitative data) by wading upstream between stop nets. Single pass fishing generates a "minimum estimate" of the fish population size and three pass fishing a more accurate statistical population estimate, but the latter requires a larger number of fish to be present than is often the case in smaller streams (a rule-of-thumb is a minimum sample size of around 30 of each year class; Riley & Fausch 1992).

Generally, when a small number of brown trout (*Salmo trutta*), hereafter referred to as 'trout', are caught in the first run of a three-run sampling, fishing is terminated at that site and the semi-quantitative data is reported as a one-run minimum estimate.

Fully-quantitative data requires three fishing runs and such multi-pass removal methods use repeated sampling, and the decline in the number of trout captured between successive passes is used to estimate capture probability and species abundance. In this case we report the estimated trout population size using the method of Carle & Strub (1978) (see Hedger *et al.* 2013).

Fully quantitative data should ideally be collected from a closed population, one isolated by stop nets at the upstream and downstream margins of the sampling site. Stop nets were not used in this survey because of the known presence of American signal crayfish (*Pacifastacus leniusculus*) locally. Nets are difficult to disinfect, so avoiding their use minimised the potential of outward transfer from the survey sites.

Trout densities are expressed as fish/100m^2 of wetted river bed and are reported here as 0+ (young-of-the-year) and 1++ (older fish). Other fish species are reported as

[5] https://www.gov.scot/publications/monitoring-watercourses-in-relation-to-onshore-wind-farm-developments-generic-monitoring-programme/

numbers caught. Site details and survey data are stored in the Scottish Fisheries Co-ordination Centre database[6]. Details of the fishery sampling sites and a summary of the fish communities recorded are given in Table 1. Fishery sampling site are shown on Figure 1.

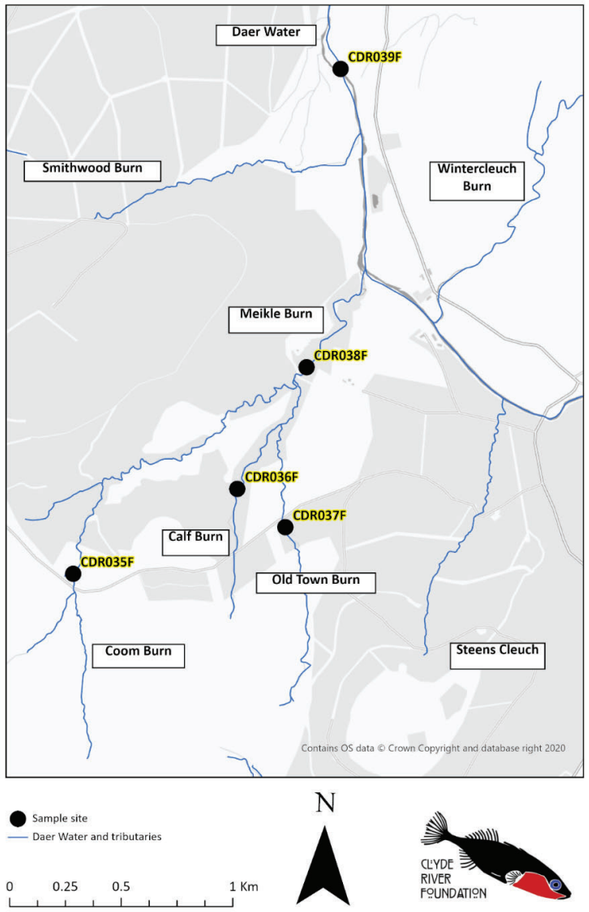

Figure 1: Fishery sampling locations; the main rivers flow from south to north.

[6] https://fms.scot/sfcc/

3. RESULTS

The survey data results are presented in **Table 1** and **Figures 2 to 5** inclusive.

No fish were captured at two of the sampling sites; CDR036F on the Calf Burn and CDR037F on the Old Town Burn.

Two species of fish were caught among the other three sites, trout and minnow (*Phoxinus phoxinus*) (**Appendix 1, Plates 6 to 8**). Trout were present at the other three sites (Site CDR035F on the Coom Burn, Site CDR038F on the Meikle Burn and Site CDR039F on the Daer Water) and minnow were caught at the two sites furthest downstream; Site CDR038F on the Meikle Burn and Site CDR039F on the Daer Water.

Young-of-the-year (0+ trout) were caught on the Coom and Meikle Burns and the Daer Water, while older (1++ fish) were captured on the Meikle Burn and Daer Water only.

Invasive, non-native American signal crayfish were found at all five sampling sites (**Appendix 1, Plate 9** and **cover image**).

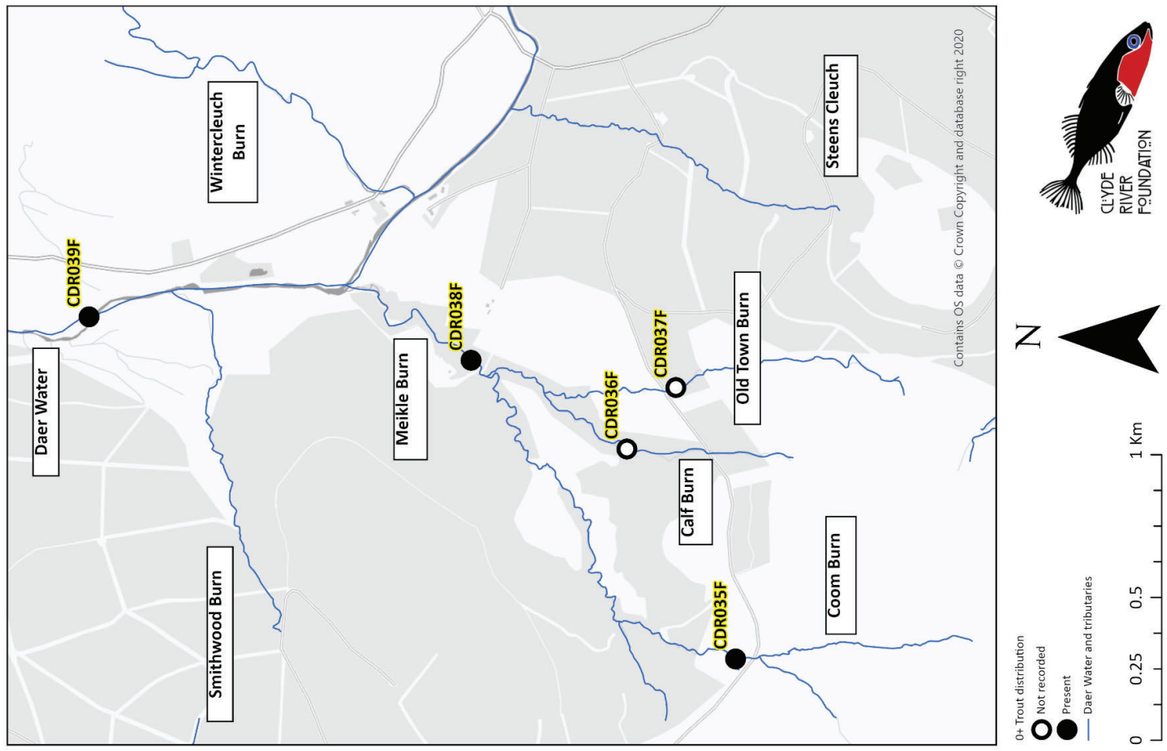

Figure 2: Distribution of 0+ trout.

Table 1: Sampling sites and summary of the recorded fish communities

Site Code (Figure 1)	Number of Fishing Runs	Watercourse	Easting	Northing	Sampling Date	Species Caught			
						0+ Trout/ 100m²	1++ Trout/ 100m²	Minnow (number caught)	American Signal Crayfish
CDR035F	1	Coom Burn	294927	608782	21/06/2024	1	9		Present
CDR036F	1	Calf Burn	295663	609163	21/06/2024	*No fish caught*			Present
CDR037F	1	Old Town Burn	295878	608991	21/06/2024	*No fish caught*			Present
CDR038F	3	Meikle Burn	295973	609708	25/06/2024	34	7	2	Present
CDR039F	1	Daer Water	296126	611046	25/06/2024	10		11	Present

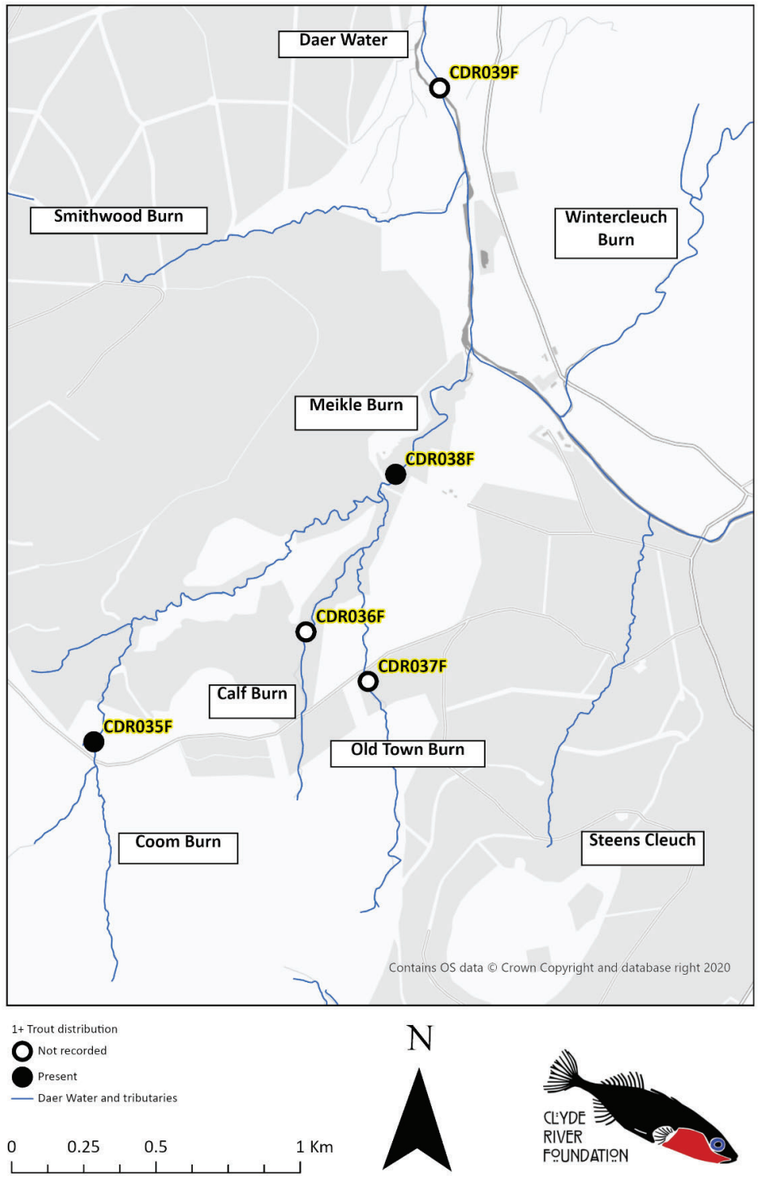

Figure 3: Distribution of 1++ trout.

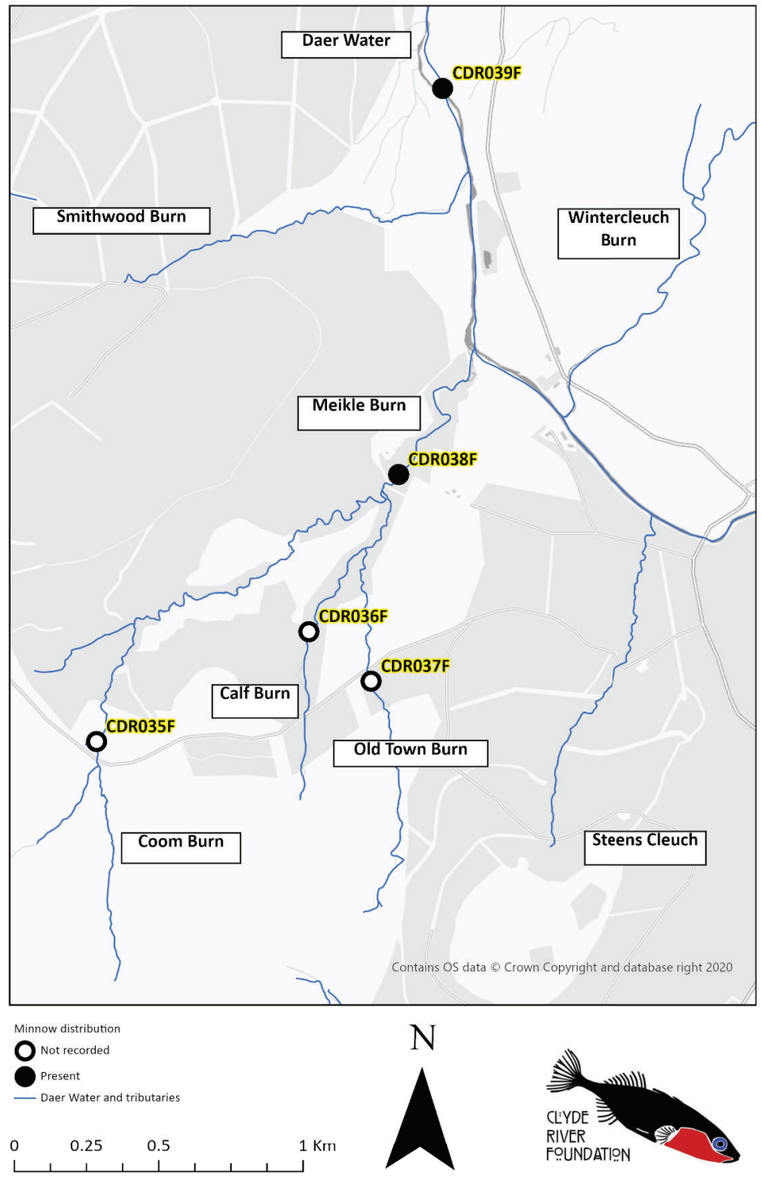

Figure 4: Distribution of minnow.

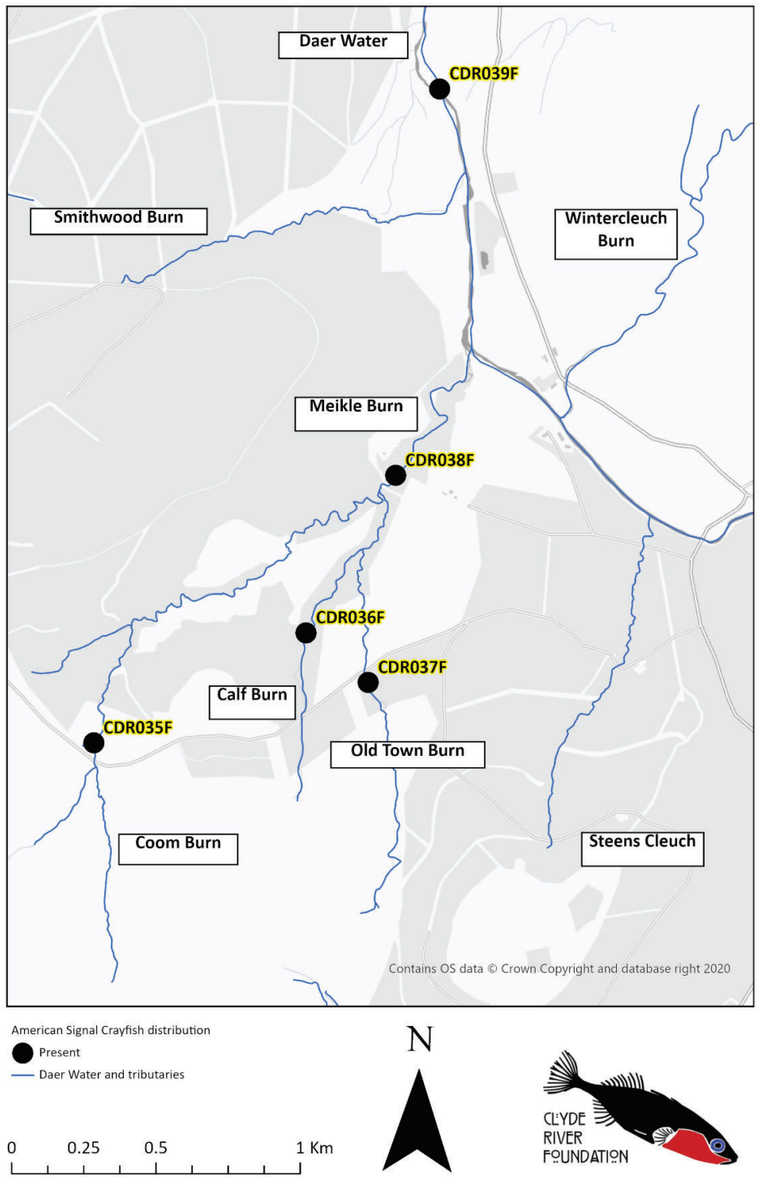

Figure 5: Distribution of American signal crayfish.

4. CONCLUSIONS

No migratory species were caught because the Falls of Clyde downstream of the survey locations prevents Atlantic salmon (*Salmo salar*) and European eel *Anguilla anguilla*) migrating as far upstream as the survey locations.

The fish community, dominated by trout, is typical of upper Clyde headwaters, with minnow appearing in lower gradient reaches. In this context, the presence of three-spined stickleback (*Gasterosteus aculaeatus*), stone loach (*Barbatula barbatula*) and brook lamprey (*Lampetra planeri*) may have been expected at the further downstream sites. However, they were absent from this survey, but may be present within the Proposed Development site.

The sampling sites on the Calf and Old Town Burns were very small and no fish were detected in either. In headwaters like these, trout populations are sparse, but it would be assumed that they are in the vicinity.

Data collected here have confirmed successful spawning by trout in the vicinity of the sampling sites on the Coom and Meikle Burns and the Daer Water during the winter of 2023/2024 . Young-of-the-year density was highest in the Meikle Burn and it is probably important for trout production in the locality, given the presence of multiple year-classes.

Trout is the most widespread and common fish species in the Clyde catchment and populations require a heterogeneous physical habitat and cold, clean water to persist. The study area appears to support permanent trout populations.

Minnow are uncommon in very small headwaters in the locality but are known from some of the shallow-gradient streams in the vicinity.

American signal crayfish were introduced to a site in the upper Clyde in the 1990s and escaped to form what is now the largest feral population of this invasive species in Scotland.

Other than the Daer Water, the sites in this survey are all new records for crayfish, the destructive pest being present in the Calf and Old Town Burns in the absence of any finfish. The presence of signal crayfish has biosecurity ramifications for any construction works and water crossings. Operationally, it would be prudent to assume that crayfish are present throughout the watercourses within the Site.

5. ACKNOWLEDGEMENTS

We thank UCAPA Ltd. for permission to use the electrofishing equipment.

6. REFERENCES

Carle F & Strub M (1978) A new method for estimating population size from removal data. Biometrics **34,** 621-630.

Hedger RD, de Eyto E, Dillane M, Diserud OH, Hindar K, McGinnity P, Poole R & Rogan G (1992) Improving abundance estimates from electrofishing removal sampling. Fisheries Research **137,** 104-115.

Riley S & Fausch KD (1992) Underestimation of trout population size by maximum-likelihood removal estimates in small streams. North American Journal of Fisheries Management **12,** 768-776.

APPENDIX 1: PLATES

Plate 1: Site CDR035F; Coom Burn.

Plate 2: Site CDR036F; Calf Burn.

Plate 3: Site CDR037F; Old Town Burn.

Plate 4: Site CDR038F; Meikle Burn.

Plate 5: Site CDR039F; Daer Water.

Plate 6: 0+ trout from Site CDR038F; Meikle Burn.

Plate 7: 1++ trout from Site CDR035F; Coom Burn.

Plate 8: Minnow from Site CDR038F; Meikle Burn.

Plate 9: American signal crayfish from Site CDR038F; Meikle Burn.

WATCHMAN ENERGY PARK ACCESS TRACK FISH SURVEY 2025

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Cover Photograph: 0+ trout from the Potrail Water.

Report reference: CRF2025/15
20 August 2025

1. Introduction

MacArthur Green Ltd[1] commissioned the Clyde River Foundation (CRF) to undertake a baseline survey of the fish within three watercourses to be crossed by a proposed access track for the Watchman Energy Park, near Elvanfoot, South Lanarkshire.

2. Materials and Methods

It was planned to sample the fish communities at three sites by electric fishing on 7th August 2025. One site was located on the Potrail Water, with one on the Benuff Burn and one on an un-named tributary of the Potrail Water **(Figure 1; Appendix 1, Plates 1 to 3**). The site on the un-named tributary was found to be unfishable.

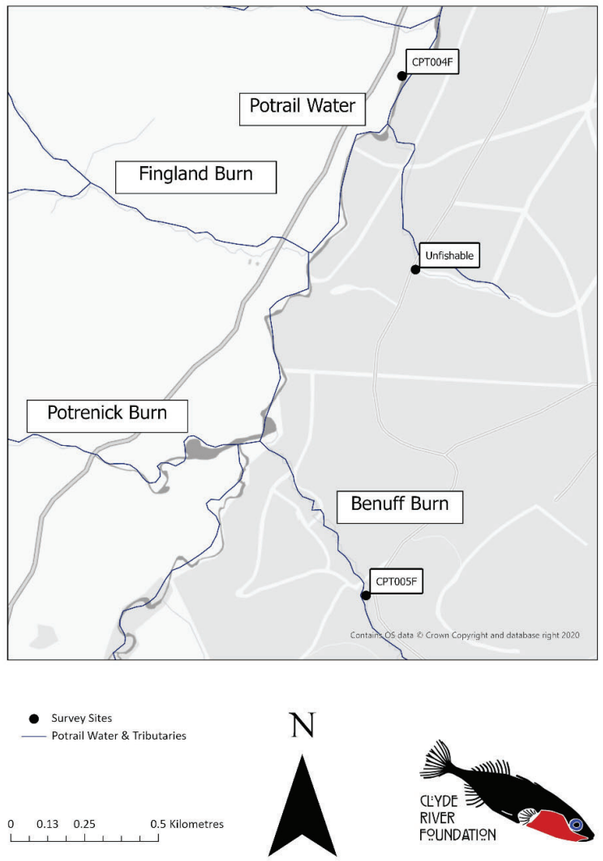


Figure 1: Sampling Site Locations (the Potrail Water flows from south-west to north-east)

Following the guidance provided by Scottish Government scientists[7], electric fishing was carried out using an E-Fish 500E backpack (fishing setting 200V smoothed DC). Fish were caught using a banner net and / or short-handled fry nets where conditions were appropriate. When captured, fish were anaesthetised in a dilute solution of 2-phenoxyethanol, identified and their fork length measured to the nearest mm on a lengthing board. Fish were allowed to recover in natal water before being returned to the river.

Sites were fished with a single pass (semi-quantitative data) by wading upstream. Single pass fishing generates a "minimum estimate" of the fish population and is the normal statistic used to describe small salmonid populations, as is often the case in smaller streams (a rule-of-thumb is a sample size of fewer than 30 of each year class; Riley & Fausch 1992). These data underestimate the true population size.

Trout densities are expressed as fish/100m^2 of wetted river bed, with other species as the number caught. Site details and survey data are stored in the Scottish Fisheries Co-ordination Centre database[8]. Details of the fishery sampling sites and a summary of the fish communities recorded are given in Table 1. Fishery sampling sites are shown on Figure 1.

[7] https://www.gov.scot/publications/monitoring-watercourses-in-relation-to-onshore-wind-farm-developments-generic-monitoring-programme/
[8] https://fms.scot/sfcc/

3. Results

A total of three species of fish were recorded among the two fishable sites.

Brown trout, stone loach and brook lamprey were recorded at the site on the Potrail Water (CPT004F), but only brown trout at the smaller site on the Bennuff Burn (CPT005F) (**Table 1; Figures 2 to 4; Appendix 1, Plates 4 to 7**).

Only young-of-the-year (0+ trout) were present at each site at densities of 15/100m^2 in the Potrail Water and 10/100m^2 in the Bennuff Burn (**Table 1**).

American signal crayfish were also present at the Potrail Water site (**Figure 5**).

Table 1: Sampling Site Details and Fish Communities

Site Code	Watercourse	Easting	Northing	Density of 0+ trout (fish/100m^2)	Stone Loach (number caught)	Brook Lamprey (number caught)
CPT004F	Potrail Water	294318	611417	15	1	1
CPT005F	Bennuff Burn	294196	609656	10		

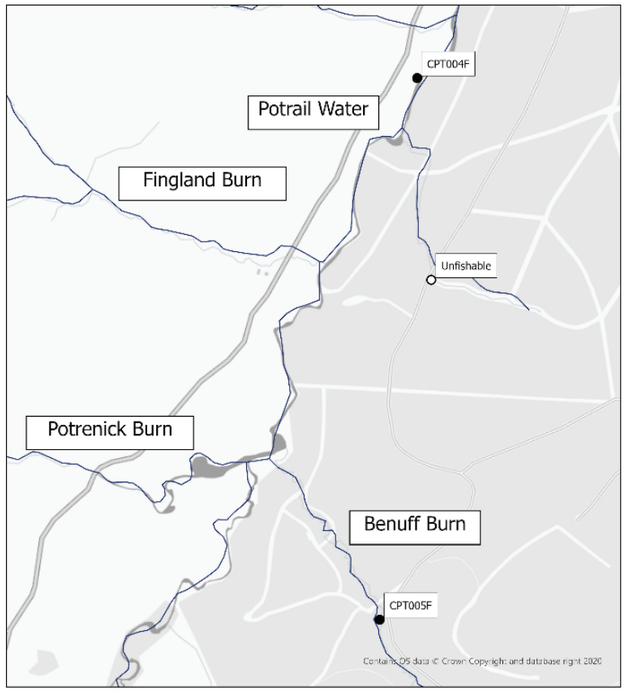
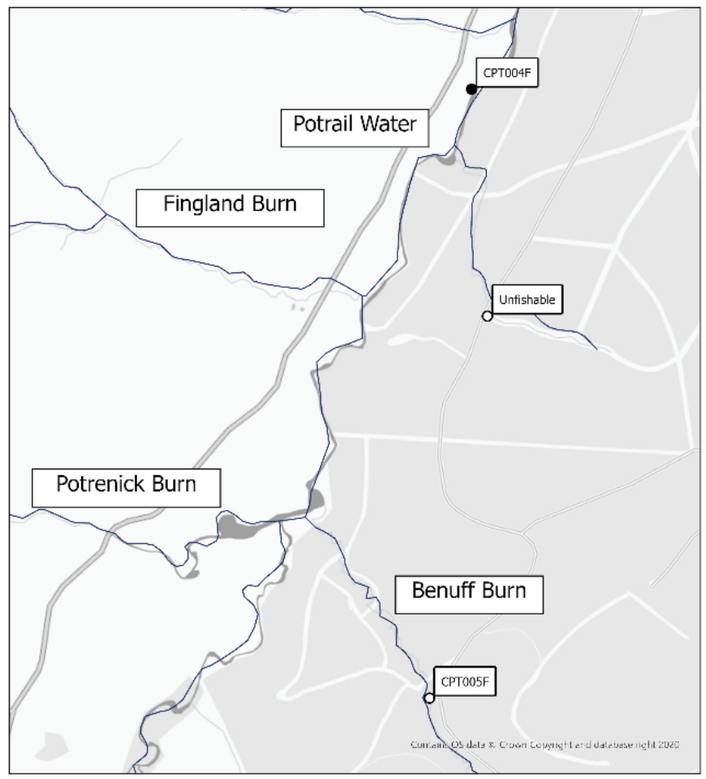


Figure 2: 0+ Brown Trout Distribution



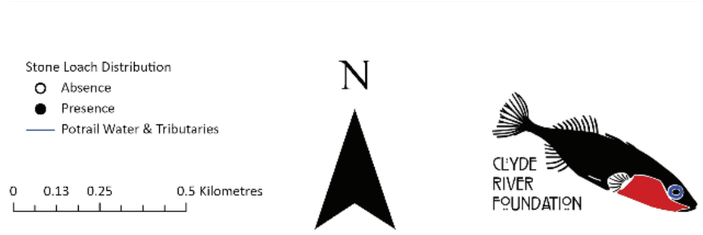


Figure 3: Stone Loach Distribution

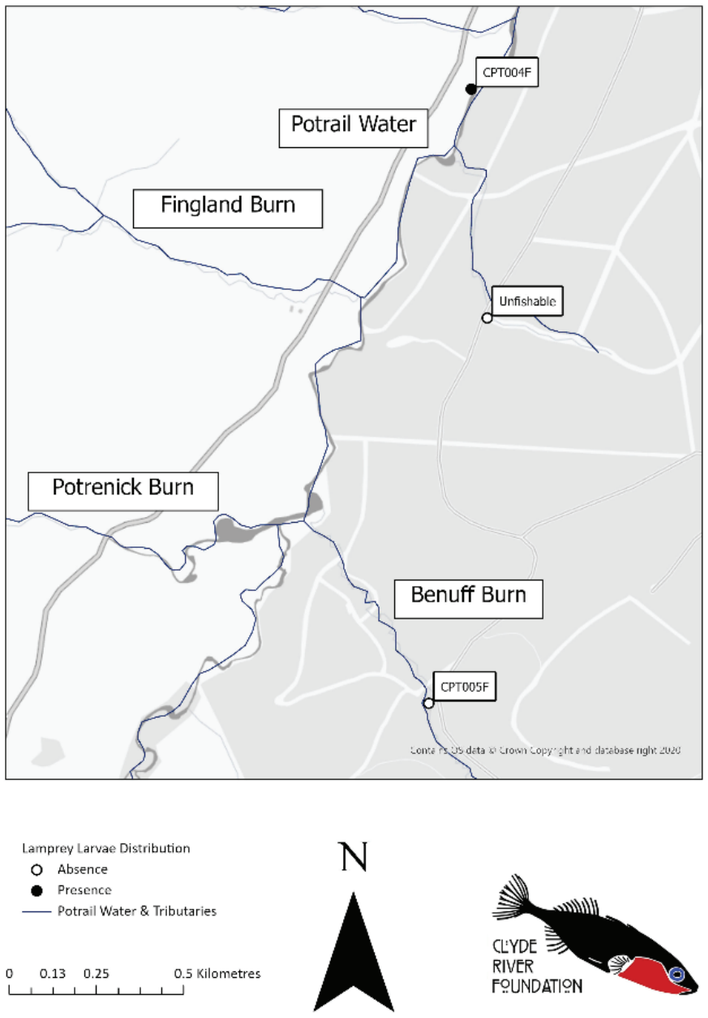


Figure 4: Brook Lamprey Distribution

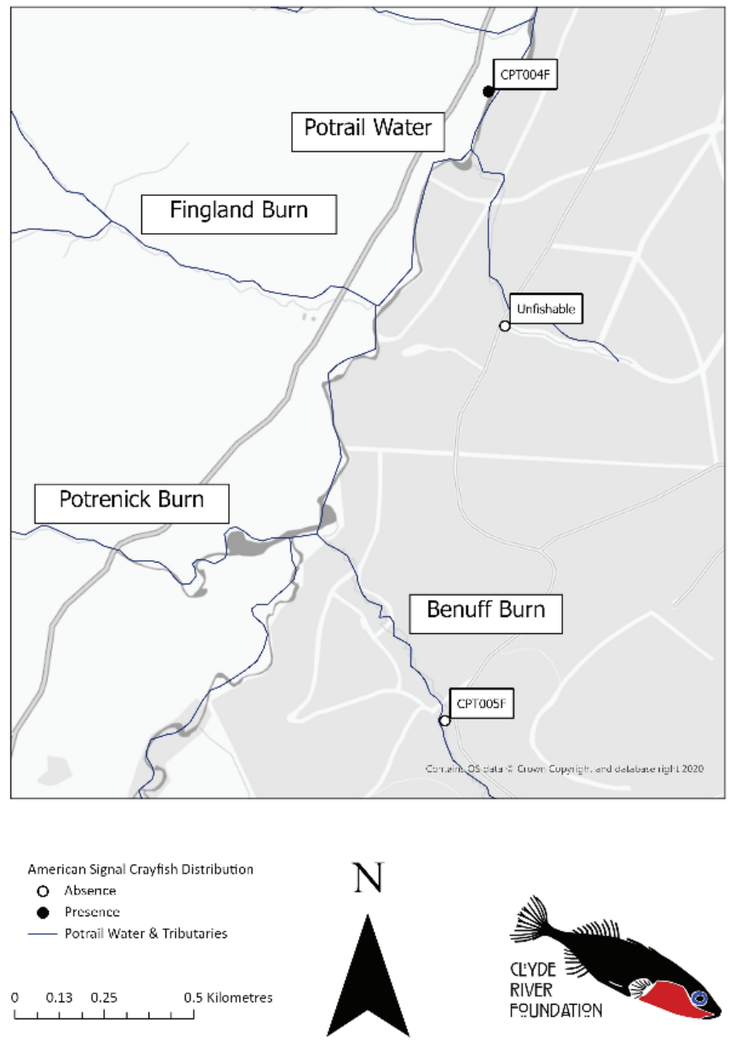


Figure 5: American Signal Crayfish Distribution

4. Conclusions

The fish communities of Clyde catchment headwaters are almost always dominated by low densities of trout and that is the case here.

The presence of 0+ fish indicates successful spawning in the vicinity of each sampling site during the previous winter. It is likely that there is a permanent population of trout in the Benuff Burn and there is certainly one in the Potrail Water despite the absence of 1++ fish in these samples.

There is no fish or fishery interest in the un-named tributary of the Potrail Water.

American signal crayfish are known to be present in the Potrail Water upstream of Site CPT004F (CRF, unpublished data) and the current survey confirms that extreme caution should be taken to avoid the onward transfer of the invasive crustacean on personnel or machinery following any instream engineering works.

5. Reference

Riley S & Fausch KD (1992) Underestimation of trout population size by maximum-likelihood removal estimates in small streams. North American Journal of Fisheries Management **12,** 768-776.

APPENDIX 1: PLATES

Plate 1: Site CPT004F, Potrail Water

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Plate 2: Site CPT005F, Benuff Burn

Plate 3: Proposed site on Un-named Tributary

Plate 4: 0+ brown trout from Site CPR005F

Plate 5: Stone loach from Site CPR005F

Plate 6: Brook lamprey from Site CPR005F

Plate 7: American signal crayfish from Site CPR005F