Glentarken Wind Farm

Fish Survey Report

Technical Appendix 7.4

Date:	03 December 2024
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

GLENTARKEN WIND FARM – BASELINE FISH SURVEY

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

Sampling site TGT001F, Glentarken Burn

Clyde River Foundation, Graham Kerr Building, University of Glasgow, Glasgow, G12 8QQ

Correspondence: [redacted]

www.clyderiverfoundation.org

Report reference: **2023/14**

Date: **22 September 2023**

Project supported by MacArthur Green

1. INTRODUCTION

The Clyde River Foundation (CRF) was contracted by MacArthur Green to undertake a survey of the fish in burns draining to the north shore of Loch Earn, near St Fillans, Perth and Kinross (approximate NGR is NN 644624) as a baseline survey for Glentarken Wind Farm (hereafter referred to as the 'Proposed Development').

2. METHODS

The fish communities at eight sites were sampled by electric fishing on 23/08/2023 and 24/08/2023 (Figure 1; Appendix 1, Plates 1-8). The surveys were undertaken by an experienced team led by highly experienced fisheries biologists.

Following the guidance provided by Scottish Government scientists[1], 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 lengthening 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[2]).

Generally, when a small number of trout (*Salmo trutta)* are caught in the first run of a three-run sampling, surveying is terminated, 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 abundance. In this case the estimated trout population size is reported using the method of Carle & Strub (1978)[3] (see Hedger *et al.* 2013[4]).

[1] https://www.gov.scot/publications/monitoring-watercourses-in-relation-to-onshore-wind-farm-developments-generic-monitoring-programme/. [Accessed August 2024]
[2] 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.
[3] Carle, F. & Strub, M. (1978). A new method for estimating population size from removal data. Biometrics 34, 621-630.
[4] 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.

Trout densities are expressed as fish/100 m^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[5] database. Details of the fishery sampling sites, and a summary of the fish communities recorded are given in **Table 1**.

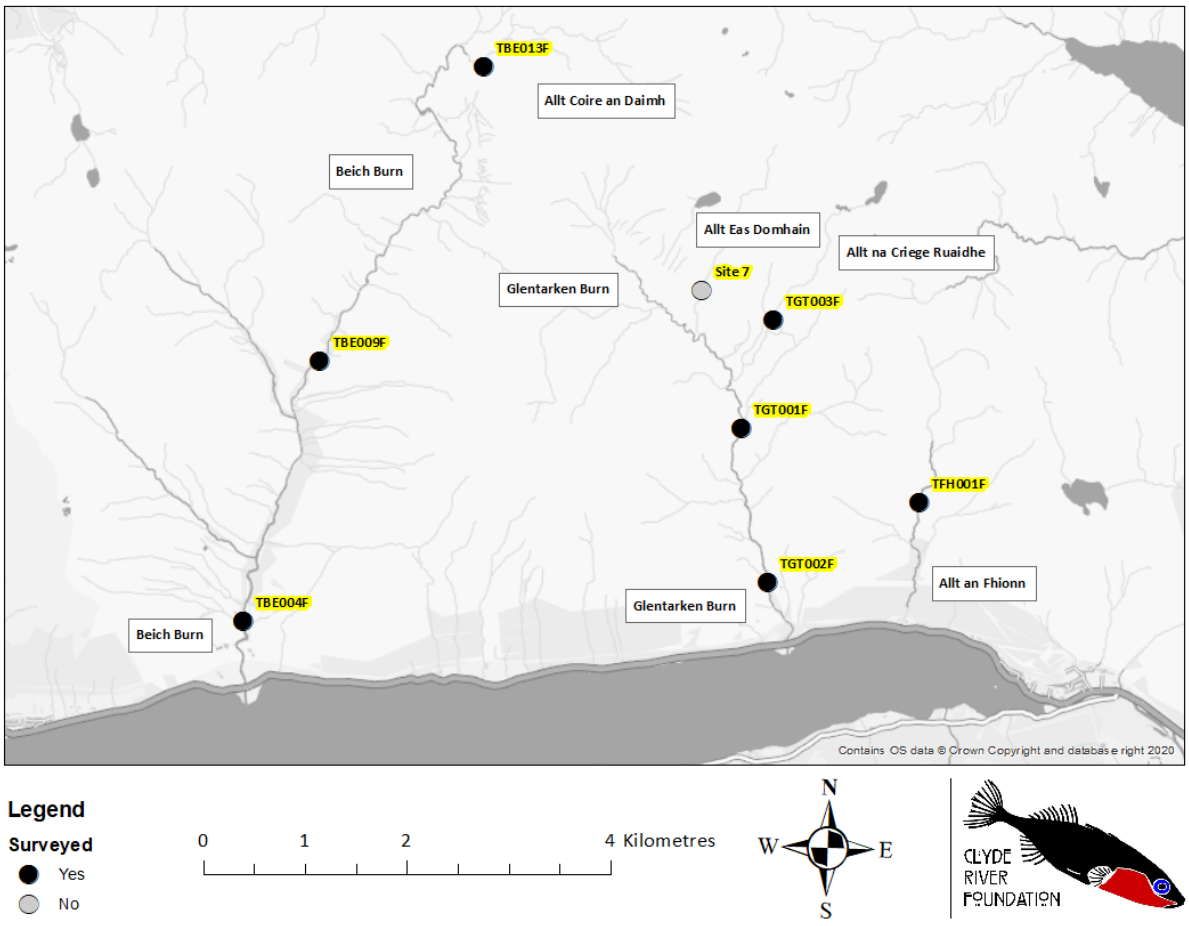

Figure 1: Fishery sampling locations; the main rivers flow from north to south.

[5] https://fms.scot/sfcc/. [Accessed August 2024]

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/ 100 m^2	1++ Trout/ 100 m^2	Minnow (number caught)	Stone Loach (number caught)
TBE013F	1	Beich Burn	264031	730313	23/08/2023	6	2		
TBE009F	1	Beich Burn	262428	727424	23/08/2023		2 fish seen but not caught		
					26/10/2017[6]	*1*	*2*		
TBE004F	1	Beich Burn	261671	724870	23/08/2023	3	1	1	1
					26/10/2017[6]	*5*			
Site 7		Allt Eas Domhain	266195	728064	24/08/2023	Not fished			
TGT003F	1	Allt na Criege Ruaidhe	266877	727829	24/08/2023	No fish caught			
TGT001F	1	Glentarken Burn	266567	726759	23/08/2023	1		12	
TGT002F	1	Glentarken Burn	266802	725251	23/08/2023	1	3		
TFH001F	1	Allt an Fhionn	268314	726034	24/08/2023	No fish caught			

[6] Date sourced from Clyde Rivers Foundation archive data

3. RESULTS

The fish survey data are presented in **Table 1**.

Of the eight sites scheduled for survey, Site 7 on the Allt Eas Domhain was found to be unsuitable for fish and was not electrofished.

Among the other seven sites, no fish were caught at two; Sites TGT003F (Beich Burn) and TFH001F (Allt an Fhionn) and fish numbers were low at the other sites.

No diadromous species (salmon (*Salmo salar)* or eel (*Anguilla anguilla)*) or lampreys (*Petromyzon marinus)* were caught.

Trout were caught at four sites (**Figure 2** Figure **3**) and were observed at another (**Table 1**). Additional data is shared from the CRF archive for two sites on the Beich Burn (**Table 1**) which confirm the presence of trout at Site TBE009F in 2017 (CRF archive data).

Only three species of fish were caught, and overall numbers of fish were low. Other than trout, minnow (*Phoxinus phoxinus)* were present at two sites (**Figure 4**) and stone loach (*Barbatula barbatula)* at one (**Figure 5**).

Multiple year-classes of trout were present at three sites; TBE013F and TBE004F on the Beich Burn and Site TGT002F on the Glentarken Burn. The presence of young-of-the-year (0+) fish indicating successful spawning during the previous winter in the vicinity of the above Sites.

4. CONCLUSIONS

Notwithstanding the very small number of fish caught in total (only requiring single fishing runs and consistent with the 2017 survey; CRF archive data) it is reasonable to conclude that brown trout are permanently present over the entire surveyed lengths of the Beich and Glentarken Burns.

Minnow and stone loach were less widespread than trout.

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).

It appears that abstraction prevents trout being present in the lower Allt Eas Domhain and the Allt an Fhionn; the former being dry and the latter a series of pools below their respective abstractions. It is also possible that a steep gradient in Allt Eas Domhain contributes to the absence of fish here.

No fish were caught at Site TBE009F in the middle reach of the Beich Burn but two 1++ trout were seen there (and a 0+ fish were recorded there in 2017). Despite the presence of impassable barriers downstream, it appears that a small population of brown trout persists there.

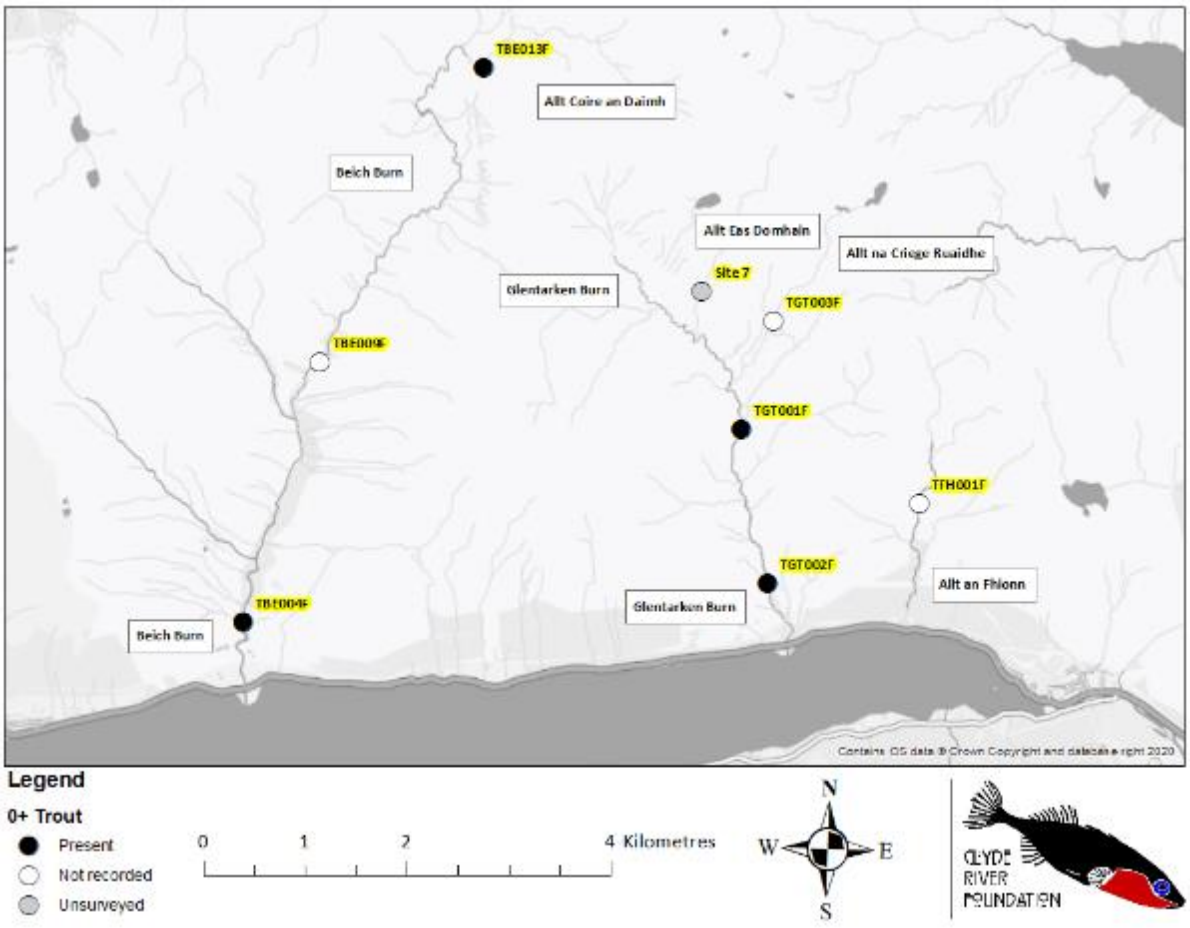

Figure 2: Distribution of 0+ trout.

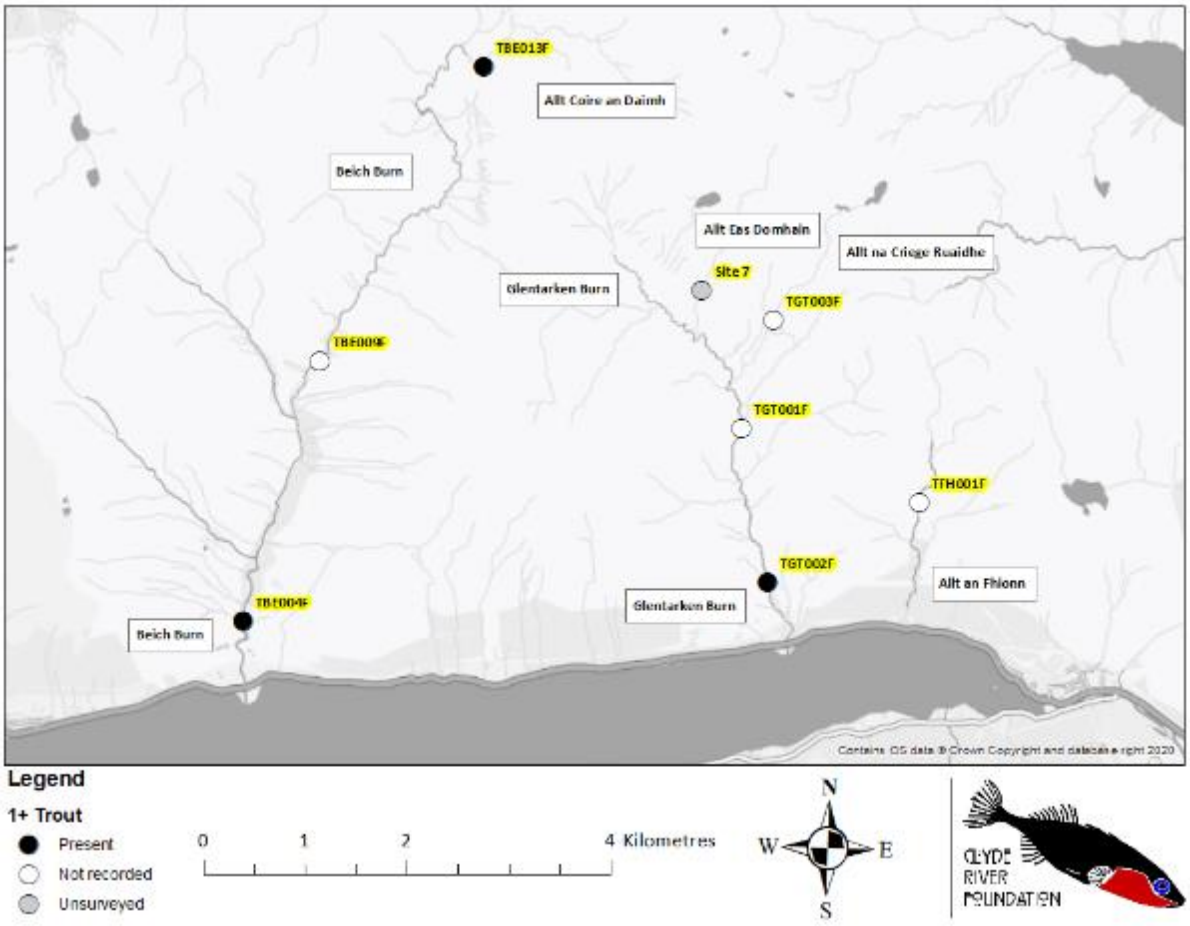

Figure 3: Distribution of 1++ trout.

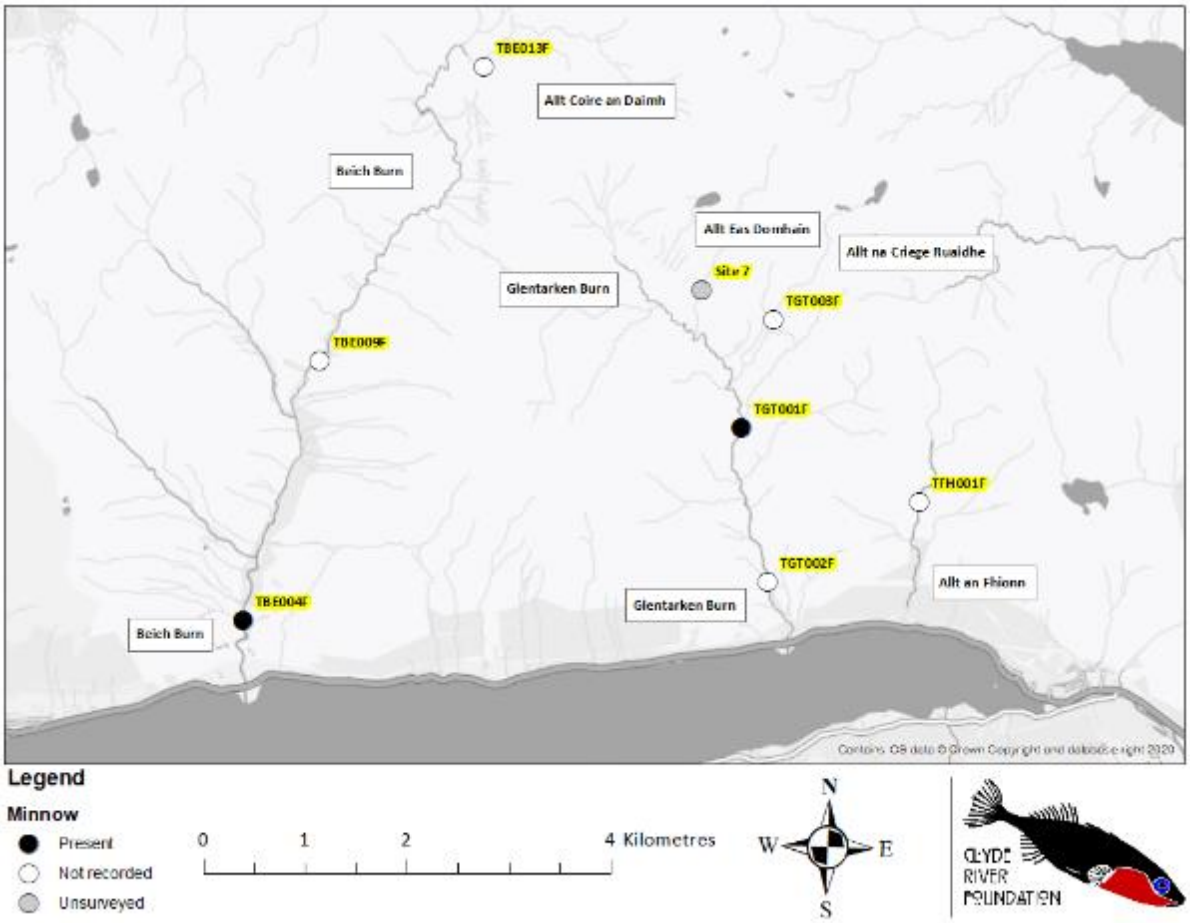

Figure 4: Distribution of minnow.

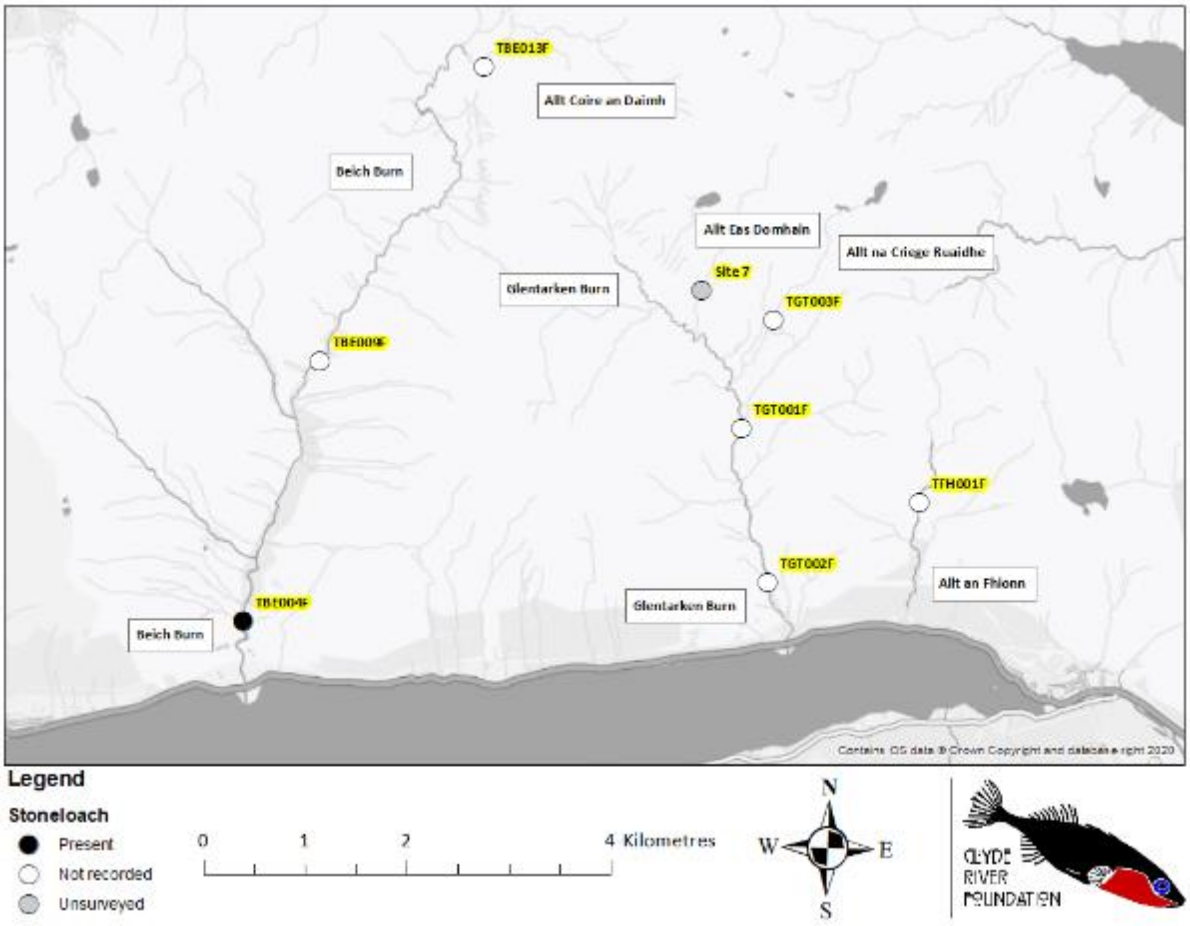

Figure 5: Distribution of stone loach.

5. ACKNOWLEDGEMENTS

We thank the Tay District Salmon Fishery Board for permission to use the electrofishing equipment.

APPENDIX 1: PLATES

Plate 1: Site TBE013F, Beich Burn.

Plate 2: Site TBE009F, Beich Burn.

Plate 3: Site TBE004F, Beich Burn.

Plate 4: Site 7; Allt Eas Domhain, not fished; looking upstream to the abstraction point.

Plate 5: Site TGT003F, Allt na Criege Ruaidhe.

Plate 6: Site TGT001F, Glentarken Burn.

Plate 7: Site TGT002F, Glentarken Burn.

Plate 8: Site TFH001F, Allt an Fhionn.