

West Sutherland Fisheries Trust

2023 Electro-fishing Surveys

A report to the West Sutherland Fisheries Trust, Report No. WSFT01/24

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Introduction

During 2023 West Sutherland Fisheries Trust again participated in the National Electrofishing Programme for Scotland (NEPS) under contract from the Marine Directorate (previously Marine Scotland Science). This project aims to gather data on salmon populations throughout Scotland and will be trialled for potential use in determining conservation limits for salmon. The sites were picked at random across a variety of West Sutherland catchments, in areas accessible to salmon. Ten of these sites were sampled using the protocol for the SFCC fully quantitative survey method, with the remaining 20 surveyed using the semi quantitative method. In addition to these sites, we also undertook electrofishing at multiple sites.

In 2023 the Laxford catchment was given it's own diet of 10 sites by request of AST, and removed from the Northwest strata. This resulted in a total of 30 sites for the Northwest area, and 10 sites for the river Laxford.

Method

Electro-fishing equipment operates by creating an electrical field in the water which affects the muscles of the fish, causing them to swim towards the positive electrode (anode) and subsequently immobilises them for a brief period. At this point they can be captured for processing before being released unharmed into the river sections from which they were caught. As the electrical field is restricted in size and the conductivity of the water generally extremely low in most WSFT catchments, the best operating conditions are within shallow water in narrow tributaries. While it is possible to sample large main river stems, the escape rate is higher than that found in the narrower tributaries. Similarly, a high escape rate is found in exceptionally shallow, stony, or weedy areas, where fish can move into the substrate and are thus inaccessible to the nets.

Fish densities were assessed using an electracatch backpack supplying smooth direct current (DC). Fish drawn to the hand-held anode were netted into a bucket and were retained until the end of the run for processing. The sites were fished systematically in an upstream direction, applying the same fishing pressure throughout to ensure that all fish had the same probability of capture as far as possible, thus increasing the reliability and accuracy of the minimum estimates of density.

All fish were anaesthetised using Tricaine Pharmaq, identified to species and measured (± 1 mm). Small scale samples were taken from a proportion of each length range for age determination. The fish were then placed in a bucket before being returned to the survey site upon complete recovery.

Bankside and instream characteristics, including substrate type, water flow, and riparian cover, were recorded at each site in accordance with the SFCC habitat survey associated with electrofishing surveys.

This report presents the data gathered from these surveys as minimum density estimates per 100 m² (e.g. data from the first sample run only) in order to present a picture of juvenile salmonid densities across the West Sutherland area for 2023 and to allow comparison across all sites. Water level was not used in the density estimates, although it must be realised that stream conditions will have an impact on the density determined and efficiency of the fishing technique. The full NEPS report will be produced by the Marine Directorate during 2024.

Results

Due to wet weather conditions, not all of the NEPS sites for 2023 were completed. A total of 24 of 30 NEPS sites for the area were completed, and 9 of 10 fished for the Laxford.

The average densities of fish within each catchment are summarised (Table 1). 'NEPS additional sites' is an amalgamation of catchments where there are only 1 or 2 sites surveyed – Hope, Polla, Sandwood, Polly, and Garvie. This allows comparison between the catchments, although it should be noted that temporal changes in density throughout the summer months and habitat differences between catchments are not considered in this table. The timing of sampling is important, with fish moving within the tributaries as a result of water height and temperature, food availability and size. Thus, sampling after a spate may give a low density as a result of washout, whilst drought may decrease density as fish move into deeper water to avoid predation or desiccation or may increase density as a result of concentration in severe cases. Similarly, densities will be greater shortly after hatching, reducing with time as the fish grow and require a larger territory for survival.

Table 1: Average densities of salmonids per catchment surveyed.

	Number of fish per 100m ²			
	Salmon Fry	Salmon Parr	Trout Fry	Trout Parr
Dionard	15.06	7.86	6.56	4.32
Laxford	17.50	8.95	16.94	7.46
Maldie	0.00	0.00	25.08	16.15
Clashnessie	0.00	0.00	10.58	15.42
Oldany	0.00	2.23	15.02	2.72
Inver	27.08	17.37	3.46	4.79
Other NEPS Sites	15.21	4.44	3.62	2.10
West Sutherland Average	10.69	5.84	11.61	7.56

As evident from Table 1 and Figures 1 and 2, there is a good distribution of salmonid species throughout the West Sutherland area with trout present in every system surveyed. Salmon were present in most catchments and would not be expected in the Maldie as a result of natural barriers downstream of the survey area. Clashnessie is not known as a migratory system, although the occasional salmon has been found indicating that the sand barrier at the mouth can be accessed under specific circumstances. The area average trout densities are greater than salmon densities.

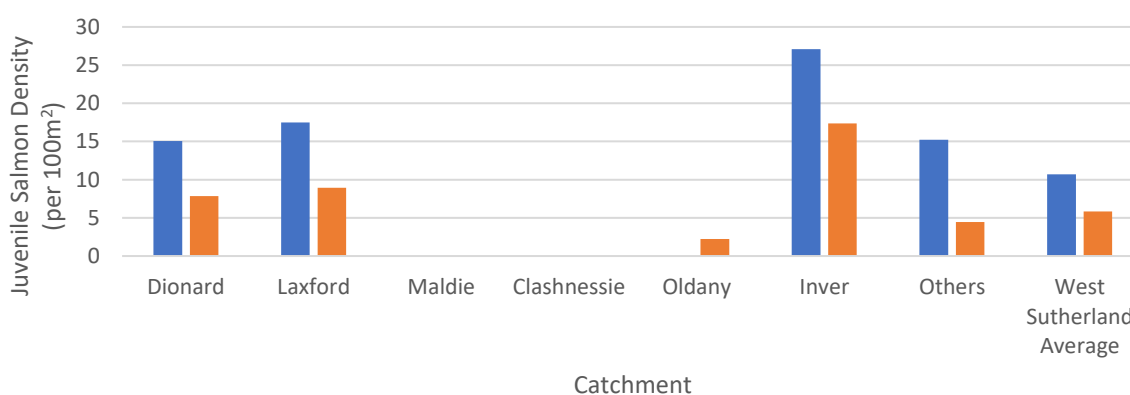


Figure 1: Average salmon fry and parr densities within West Sutherland catchments shown alongside the average fry and parr densities for the West Sutherland area 2023.

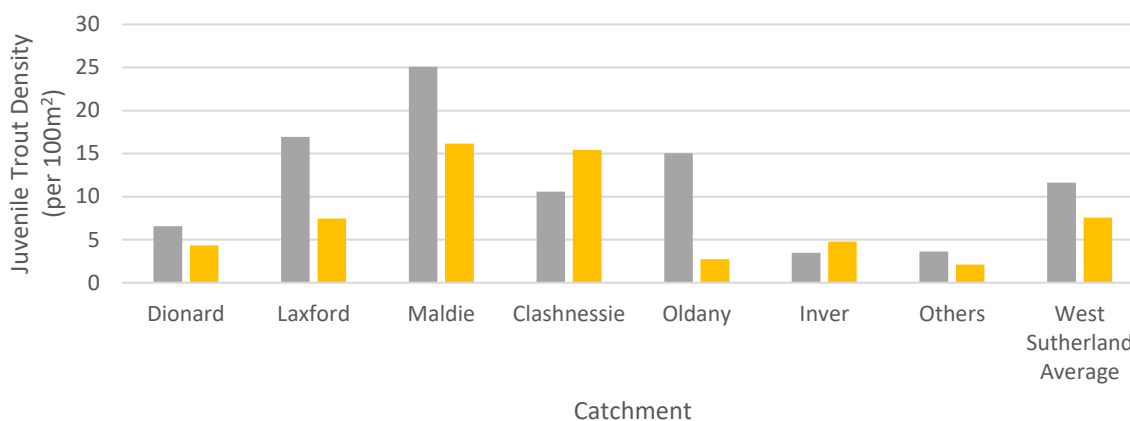


Figure 2: Average trout fry and parr densities within West Sutherland catchments shown alongside the average fry and parr densities for the West Sutherland area 2023.

The SFCC absolute regional classification scheme, presented in Table 2, was developed so that fish populations could be compared across Scotland, allowing electrofishing results in Sutherland to be presented in a Scottish context. This does not consider river width, which is known to adversely affect fishing efficiency - lowering estimated salmonid densities with greater width. When compared to the SFCC regional classification scheme for the Northwest area, salmonid densities range from absent (unclassified) to excellent with a lot of within-catchment variation in part due to the location, habitat type, and accessibility.

Table 2: SFCC salmonid density classification scheme for the Northwest area

SFCC Class	Descriptor	Minimum density (100 m ²)			
		Salmon fry	Salmon parr	Trout fry	Trout parr
A	Excellent	26.05	13.09	15.80	8.58
B	Good	14.15	8.04	8.25	4.31
C	Moderate	8.00	4.67	4.26	2.72
D	Poor	4.42	2.58	1.99	1.52
E	Very poor	0.78	0.66	0.44	0.22
U	Unclassified	0.00	0.00	0.00	0.00

The percentages of SFCC classifications across the west Sutherland area for 2023 are displayed in Figure 3. 50% of all sites were classed as having moderate to excellent salmon fry densities (20% classed as excellent), with salmon parr densities classed as moderate to excellent within 53% of all sites (18% classed as excellent). Trout fry densities were classed as moderate to excellent in 53% of all sites, (13% classed as excellent), with 58% of sites containing moderate to excellent trout parr densities (28% classed as excellent).

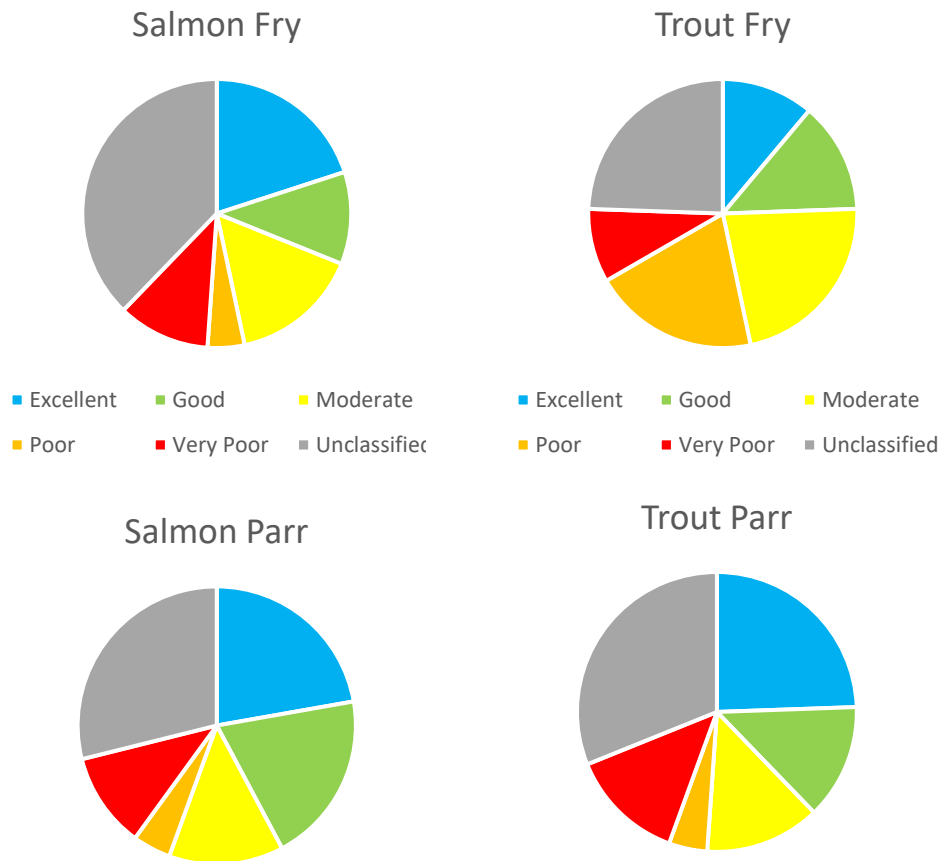


Figure 3: West Sutherland area salmonid densities according to the SFCC classification scheme

While undertaking these surveys we also encounter other species within the sites. Trout can be seen to be present in most sites surveyed, present in all sites in the Clashnessie, Maldie, and Oldany catchments (Fig. 4). Salmon, in contrast, were only present at all sites in the Dionard. Eels were present in all catchments, but not in all sites, indicating some variability in distribution. Minnows were also widespread throughout the area, but only present in less than 45% of sites in any one catchment. This is likely to reflect the location of the sites and the fact that the minnow is an introduced species and therefore more likely to be patchily distributed. Stickleback were not recorded in any catchments this year.

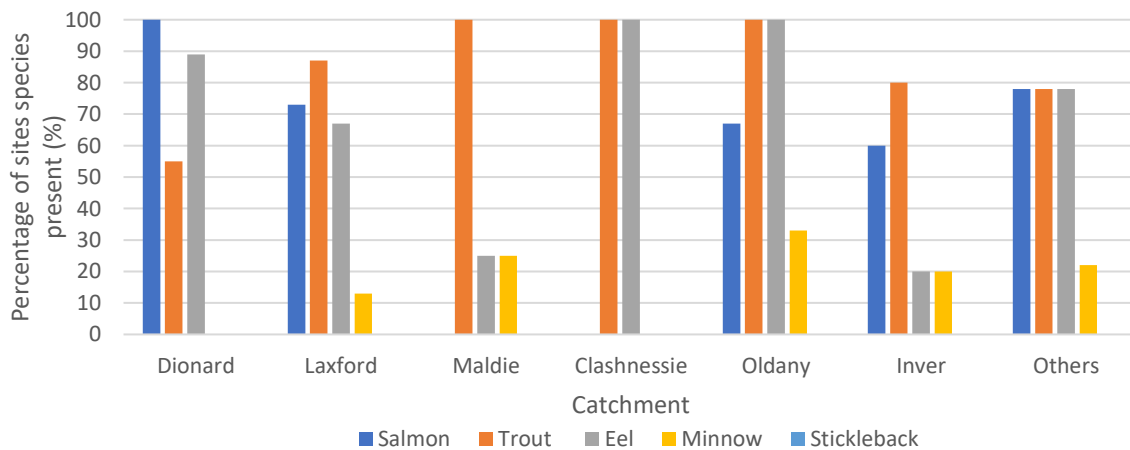


Figure 4: Species composition and distribution per catchment

Discussion

Catchments surveyed during 2023 included 2 trout dominated systems, of which 1 is inaccessible to migratory salmonids. However, the majority are fully accessible and show a good mix of species which would suggest that the area average is a good reflection of the situation within West Sutherland and not dominated by catchment selection. This indicates that trout have the greatest fry densities within the survey, and the greatest overall densities, with trout parr also more numerous than salmon parr. This reflects the sites surveyed and the fact that resident trout will result in a greater age range within the systems and therefore more parr.

Whilst instream habitat characteristics within the West Sutherland area are generally favourable for salmonids, strategic planting of mixed broadleaf trees within riparian zones and the addition of large woody debris to instream areas would undoubtedly improve fish cover, food availability, and bankside stability. With only around 50% of the sites showing moderate to excellent fish densities for both species and stages, improvements in habitat quality and therefore fish density, would be welcome.

The widespread occurrence of eels throughout the area is encouraging, particularly considering the endangered status of the species. It was especially encouraging to find individuals above the waterfalls in the Maldie, and above the sluice in Loch Assynt. While numbers were not high at most sites, the species was not being targeted and this is likely to have influenced these results. The spread of minnows within the area, in contrast, is of some concern and largely reflects angler practice. Introduced historically as live bait, their spread partly reflects the accessibility of the sites, i.e. proximity to roads, and their relatively high reproductive rate. Where present they can out-compete salmonids, thus impacting on their population.

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