Marine Directorate
Topic Sheet
January 2026

Scottish Government
Riaghaltas na h-Alba

# Electrofishing Data Analysis Tool for National Electrofishing Programme for Scotland (NEPS) Collaborators

Figure 1&2: Examples of electrofishing

## Introduction

Electrofishing (where fish are temporarily stunned and captured) is a widely applied sampling method for monitoring numbers of salmon, trout and other fish species in freshwater. When performed to carefully defined standards and combined with an appropriate survey design and statistical analysis, these data can provide assessments of abundance, status and trends. When information on environment (e.g. water quality, genetic introgression) is collected alongside these data, this provides a strong basis for identifying and managing pressures.

The National Electrofishing Programme for Scotland (NEPS) depends on a series of complex models, and modelling approaches developed by Marine Directorate. These are not always readily accessible to local fisheries managers. However, it has become possible to make complex outputs (including models and spatial data) available through user friendly computer programmes known as R Shiny Apps. The Marine Directorate has developed an application (tool) to allow local fisheries managers (that are also NEPS collaborators) to apply some of the models developed by Marine Directorate for NEPS, to locally collected electrofishing data collected for other purposes.

## What is the NEPS Electrofishing Data Analysis Tool?

The electrofishing tool allows local fisheries managers to upload electrofishing count data (i.e. the number of a particular species and life-stage of fish caught on a particular pass of an electrofishing survey) to obtain estimates of the total densities of salmon and trout, fry and parr at a particular site. The tool uses the most recent national capture probability model for Scotland to allow densities to be calculated from single or multi-pass electrofishing data.

Resulting density estimates are exported alongside benchmarks (expected density) and performance against benchmark to allow site-wise status assessments. Results can also be plotted (and exported) on simplified maps of the river network.

## How does the tool work?

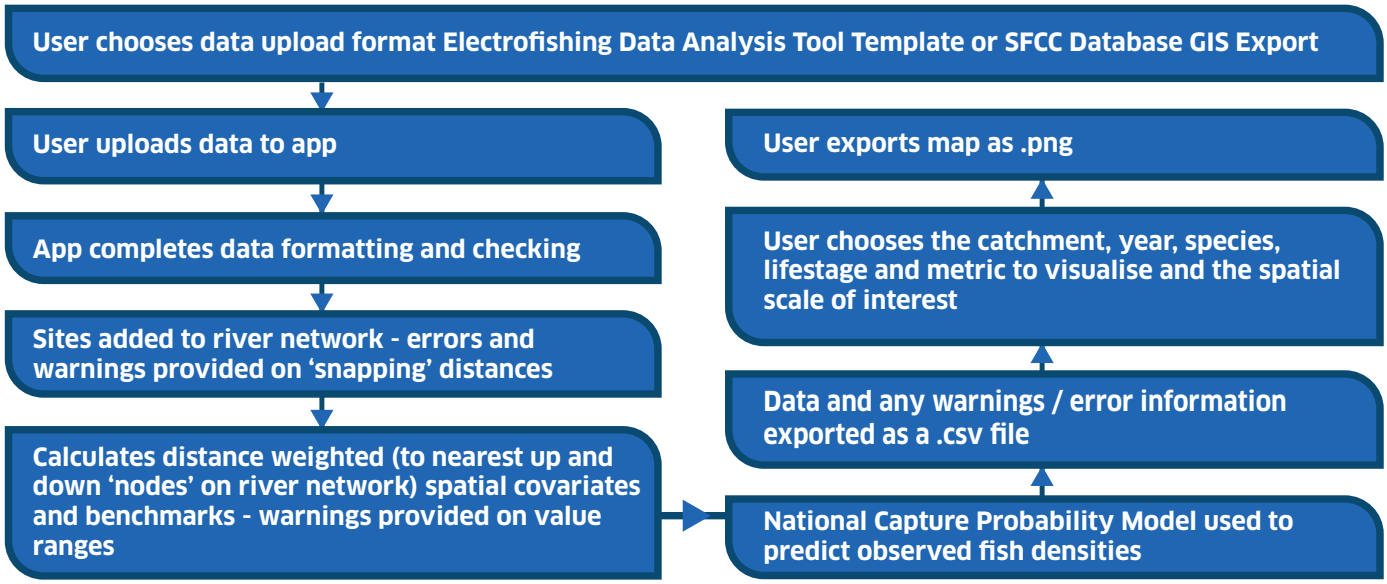
Comprehensive user instructions are contained in the NEPS EF Tool and full details of analytical approaches are available in peer reviewed publications and NEPS Reports. In brief;

- Users upload fish count data and site information (location, area fished) in one of two allowable data formats.
- Sites are added to the digital river network. Spatial covariates (including habitat proxies, salmon and trout benchmarks) are extracted from the nearest up and down stream node locations using a distance-weighted mean.
- Spatial covariates, sampling date (Year, Day of Year), electrofishing pass and Organisation (a categorical level reflecting combinations of organisation and staff) are used to predict the capture probability for each combination of site, date, species, lifestage and pass.
- Site-wise fish densities are estimated from the total counts across all passes, cumulative capture probability and site area.
- Results are exported alongside any warnings or error information

## What's new in 2025?

- Data can be uploaded in both the "Electrofishing Data Analysis Tool Template" and "SFCC Database GIS Export" to increase efficiency.
- Improved error checking, correction, and warning/error messaging within the app and data exports
- Improved code efficiency and speed of analysis
- Provision of the new trout benchmark (published in the NEPS 2023 report) within the app and exports
- Ability to get indicative salmon benchmarks for larger rivers, by capping UCA values at 256 km² for the purposes of salmon benchmark prediction.
- Ability to plot results at the catchment scale and at the spatial extent of the sites provided (e.g. a sub-catchment)

### NEPS Electrofishing Data Analysis Tool Workflow




## Further information

https://scotland.shinyapps.io/sg-neps-electrofishing-analysis-tool/

https://www.gov.scot/publications/national-electrofishing-programme-for-scotland/


© CROWN COPYRIGHT 2026