

Tay Catchment Salmon Alliance



PROJECT DESCRIPTION

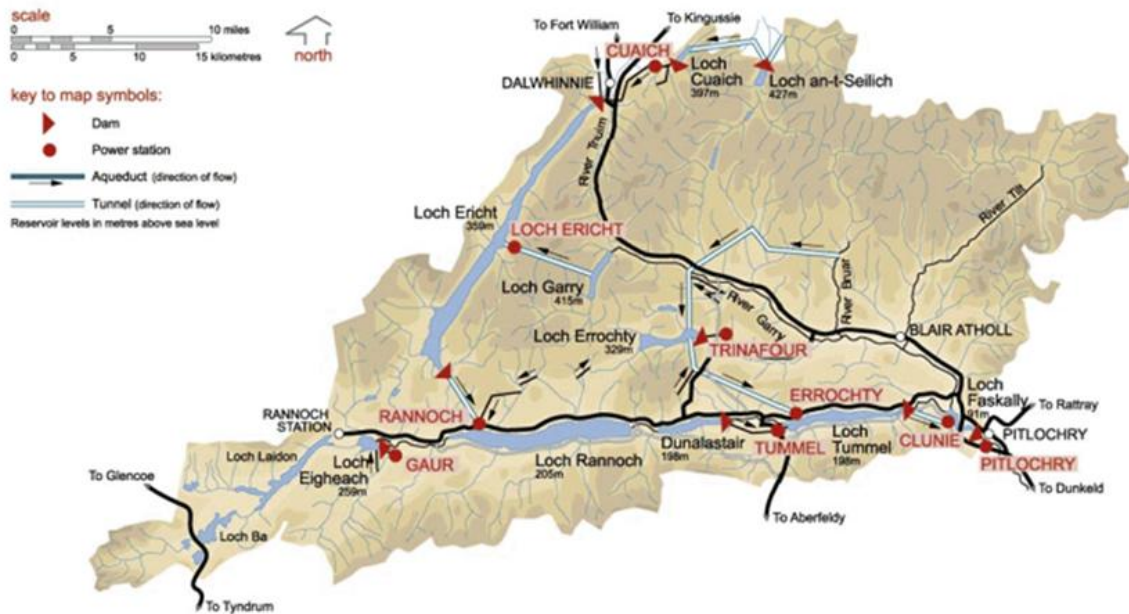
TAY ATLANTIC SALMON SMOLT MORTALITY STUDY DESIGN

BACKGROUND

The Tummel – Garry hydro scheme was a significant engineering project in the mid 20th century designed to provide electrical power to much of central Scotland. Despite many objections from local communities, land and fishery owners, the scheme progressed due to optimism and engineering prowess to what it is today – a hydro scheme with 9 power stations and 4 major dams. It is truly an engineering icon. Many of the scheme's rivers and lochs are categorised as Heavily Modified Water Bodies (defined as a body of surface water which, as a result of physical alterations by human activity, is substantially changed in character). The Scottish Government did recognise the effect the scheme would have on migratory fish and insisted on mitigation throughout the scheme, including fish passes at the major barriers.

CURRENT ISSUES

There are considerable issues encountered by migratory fish in the Tummel-Garry Hydro system. This is especially true for downstream migrating smolts each year in the March to May timeframe. Losses are considerable and depending on the routing through the system, losses could be in the order of 80-90%. Losses will be due to predation (piscivorous birds, pike and brown trout), and damage due to fish passes and passage through turbines. There have been many studies on smolt survival and there is clear evidence of very high mortality in water bodies (natural and impounded), rivers and dams and barriers.



The Tummel-Garry Hydro System

THE PROJECT

In early November 2025, Iain Law, a Board member cooptee and TCSA member, proposed a study to the TDSFB which would use latest technology sensor systems to monitor the smolt run from the Rivers Garry and Gaur through to the River Tummel below the Pitlochry Dam. The project description is contained in this document. The project will be an adjunct to a Marine Directorate study of smolt migration behaviour up the east coast of Scotland and will be managed by a team from Glasgow University. The aim is to gather the latest smolt survival information, using the latest technology sensors, which, when placed alongside previous studies, will be used to convince government and industrial stakeholders that there needs to be mitigation of issues encountered by smolts. Such mitigation could include trapping and trucking of Gaur and Garry smolts from their native rivers to below Pitlochry and the delivery of mitigation stocking in other parts of the catchment. The study evidence should also allow better access to funds which will be required to deliver the mitigation efforts.

The challenge is considerable, but the TDSFB support the project, and we are encouraged to witness Board enthusiasm for it. At fruition, this high profile and newsworthy conservation measure will result in very much higher smolt survival rates and, in turn, will result in a greater number of returning adults to the system. The expected growth in returning numbers in the Tummel also has significant exponential effects in the middle and lower beats of the Tay. To reach this outcome, making this study happen is essential.

PROJECT OBJECTIVES

The general aim of this project would be to investigate the downstream migration pathway, migration speed and the proportion of successful migrants of Atlantic salmon smolts migrating through the river from the upper river Tay catchment. Identifying areas where migration success is lower than expected is important to implement effective management plans. The upper river Tay system includes four hydroelectric dams which are potential challenge for out-migrating salmon smolts during their first migration to sea. Therefore, this study will investigate the following questions:

1. What is the overall migration success of salmon smolts from two major tributaries migrating downstream in the river Tay?
2. If any of the three impoundments (Faskally, Tummel and Rannoch) prevent or reduce the downstream passage of salmon smolts?
3. What is the rate of migration success in difference sections of the river: river, loch, estuary?
4. Does successful passage of smolts increases when the turbines are generating? (NB aim 4 will only be possible with support from SSE)

DESIGN

To address these questions, it is recommended a total of 42 x 69KHz acoustic receivers are deployed using the design outlined below.

It is recommended a total of 100 salmon smolts are tagged with V7 acoustic tags (nominal delay 18 – 38 seconds; battery life to be confirmed by manufacturer but based on previous studies would be around 60 – 70 days).

Smolts will be captured from two river tagging sites, the Garry (n= 40) and the Gaur (n = 60), with only smolts with a fork length $\geq 130\text{mm}$ and weight $\geq 20\text{g}$ being included in this study. Smolts will be captured using a rotary screw trap or fyke nets that will operate during the smolt run: March – May. Tagging requires a team of three: 1 person who has a Home Office license to conduct surgical procedures, one person who has experience tagging and a third person to assist. It is recommended no more than 20 fish are tagged in one day.

The acoustic tagging needs to be conducted by an individual who:

- Has a home office personal license (PIL)
- Has completed and passed modules L, E1, K, PILA, PILB, PILC
- Has a training record and has been signed off to work unsupervised in: tagging fish, fish handling, schedule 1 killing (and is listed on a register at the institution holding the personal license).
- Is currently working under a Home Office Project License which has acoustic tagging as a procedure and that project license has the River Tay listed as a POLE (place other than the licensed establishment)

INDICATIVE COSTINGS

Note this is based on prices from previous studies and as such should only be used as indicative costs that are subject to change

		Cost
Receivers (69 KHz) x 42 and moorings	Rental @ £250 per receiver	£10 500
Rope and steel rope for moorings		£100
Insurance for receivers	TAY	
Batteries for 42 receivers	Approx £25 per battery	£1 050
Smolt trap	£300/ month for RST	£600
Steel cable and rope to secure traps		£150
V7 Acoustic tags x 100	Approx £320 per tag	£32 000
Tagging equipment – NOTE this does not include items like buckets, nets	Surgical gloves, nitrile gloves, sutures, aerator and air stones, 12V battery, surgical equipment x 4, anaesthetic, sterilants	£1 500
Overarching study design	1 staff day	£370
Planning	Finalising receiver locations; buying equipment – 3 staff days	£1 110
	TAY – organise landowner permissions; organise smolt trapping location, Marine Directorate license for trapping fish	
Annual Tagging refresher training	£350 pp	£350
Training in the SOP	£150 pp	£450
Receiver organisation – programming	1 staff day	£370
Deploying receivers	TAY – 2 people per day	
Deploying and recovery smolt trap	TAY – 4 people per day	
Trap monitoring	TAY – 6 weeks 2 people	
Tagging	42 staff days	£15 540
Travel and Subsistence	Accommodation for 2 weeks, mileage, food for tagging team	£3 500
Receiver recovery	TAY – 2 people per day	
Receiver downloading data	2 staff days	£740
Data analysis and technical report	20 staff days	£7 400

TOTAL COST = £75 730
£100,000 including VAT

Proposed receiver positioning

