**Kirkcudbrightshire Dee Smolt Tracking Project**

**2024 Report**

**Non – technical summary**

Here we describe the results from the Kirkcudbrightshire Dee Smolt Tracking Project conducted in 2024. In addition, we draw together the data collected across the three years of the study (2021, 2023 and 2024) to provide some conclusions and present five recommendations for management of the Galloway Hydro Scheme to support the migration of salmon smolts that arise from the findings from this project.

**Findings from 2024**

* Seventeen salmon smolts were captured in April and May 2024 and fitted with a transmitter that emits a unique acoustic signal. These fish were then released downstream of the trapping site at Polharrow Burn.
* Eighteen fixed acoustic receivers (listening stations) were deployed throughout the River Dee to investigate the migration success of salmon smolts throughout the river.

In addition, in 2024 this project focused on understanding the movement of salmon smolts in relation to the operation and management of Earlstoun Dam. The main finding from this project in 2024 were:

* + Overall, migration success rate of salmon smolts through the River Dee system to upstream of Tongland Dam was 17.6%. This was lower than in previous years, 2021 (62%) and 2023 (37.5%).
  + Migration success through Earlstoun Dam was high, 91% in 2024. This is comparable with previous years, 2021 (81%) and 2023 (100%).
  + No smolts were detected migrating downstream using the fish ladder at Earlstoun Dam in 2024, therefore, all smolts migrated passed Earlstoun Dam via the turbines.
  + As with previous years, successful smolt passage through Earlstoun Dam occurred primarily during generation.

**Study Conclusions 2021 – 2024**

* During this project, migration success of smolts through Earlstoun Dam, did not change with the length of a single power generation period and was unaffected by the frequency that turbines were operational during the smolt run.
* Of the smolts that made an unsuccessful attempt at passage through the dam. 75% of these fish made another attempt (which was either successful or unsuccessful) within 5 hours and 40 mins.
* We found no effect of the frequency of turbine generations on migration success within the range in this study. However, across all years 50% of fish making a successful passage did so within 5 hours of the start of generation and 75% within 12 hours 54 mins.
* The period of the year during which smolts are migrating and thus sensitive to operation of the Galloway Hydro Scheme was highly constrained to a short period in spring. A longer time-series of data from the nearby River Bladnoch helps to define that period and its inter-annual variation, the core period being April and May.
* We conclude that the downstream success of smolts is highly dependent upon the operation of the Galloway Hydro Scheme and without management of that scheme giving consideration to smolt passage success then considerable damage to the salmon population is highly likely.
* However, we also conclude that such effective management is unlikely to deviate markedly from the operational practices observed over the last three years.
* We present a number of robust conclusions drawn from the study and make five clear recommendations around management of the Galloway Hydro Scheme that would take account of salmon smolt migration.

**Recommendations from the Kirkcudbrightshire Dee Tracking Project 2021 to 2024**

Here we make five recommendations to which we apportion a level of importance based upon their potential effect on the Atlantic salmon population in the Galloway Dee.

***Recommendation 1:*** *we recommend periods of generation are undertaken during the smolt migration season at all dams passable by salmon, throughout the scheme. Lack of generation during smolt migration in any year could result in a loss of a whole year class and have a very significant effect on the salmon population. This we regard as a critical recommendation.*

* This project has shown that the Galloway Dee Hydro-scheme is impacting the downstream migration of salmon smolts from the River Dee.
* Out-migrating salmon smolts can and do migrate successfully past the dams in the scheme, however, the findings from this project show that salmon smolts do not use the fish ladders and instead pass through the turbines (almost exclusively during generation).

***Recommendation 2****: we recommend that generation patterns are managed to facilitate smolt migration during the main migration period of 1st April to 31st May each year. We regard this as a very strong recommendation.*

* The data from the River Dee and the neighbouring River Bladnoch show that there is a strong seasonality, with some interannual variation, to the smolt migration. Outside this period any patterns of generation will have no effect on smolt migration.

***Recommendation 3:*** *we recommend that a minimum generation duration of 5 hours is needed to enable dam passage by a reasonable proportion of the fish immediately upstream of a dam. We regard this as a strong recommendation.*

* The pattern of generation that is likely to result in the most positive outcomes for smolts can be inferred from the data from this project.
* Data from the study provide some evidence of an appropriate duration of generation that will facilitate smolt migration. In most cases 50% of smolts waiting immediately upstream passed through a turbine within 5 hours. This increases to 75% of smolts if the generation duration increases to 13 hours.

***Recommendation 4****: we recommend that to most effectively prevent delays in smolt migration that there is a period of generation at each dam daily. We regard this as a strong recommendation.*

* The pattern of smolt migration over the migration season in Galloway rivers shows a concentrated period of migration ramping up to a peak and declining from that peak with some fish migrating almost every day particularly between mid Aprill and mid May.

***Recommendation 5****: we recommend that the generation periods during the smolt migration season are at dusk or darkness. We regard this as valuable recommendation.*

* Although not tested for in these studies, it is well established that smolts are more likely to migrate successfully at dusk and overnight.